FLIGHT
and
AIRCRAFT ENGINEER

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FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

Editorial, Advertising and Publishing Offices: DORSET HOUSE, STAMFORD STREET, LONDON, S.E.1
Telegrams : Flightpres, Sedist, London. Telephone : Waterloo 3333 (60 lines.)

COVENTRY: 8 - 10, CORPORATION ST. Telegrams : Autocar, Coventry. Telephone : Coventry 5210.
BIRMINGHAM, 2: KING EDWARD HOUSE, NEW STREET. Telegrams : Autopress, Birmingham. Telephone : Midland 7191 (7 lines).
MANCHESTER, 3: 260, DEANSGATE. Telegrams : Iliffe, Manchester. Telephone : Blackfriars 4412.
GLASGOW, C.2: 26B, RENFIELD ST. Telegrams : Iliffe, Glasgow. Telephone : Central 4857

SUBSCRIPTION RATES : Home and Abroad : Year, £3 1 0. 6 months, £1 10 6.

Registered at the G.P.O. as a Newspaper

No. 2033. Vol. LII. December 11th, 1947 Thursdays, One Shilling.

The Outlook

Education or Specialization ?

CONSIDERABLE uneasiness is felt in many industries concerning the education of our young men. It is felt that the present methods tend towards too early specialization in the schools, and that University graduates are often badly educated in the wider sense.

The Secondary Schools Examination Council has recently issued recommendations for the system of examinations to be adopted in future. It is proposed that the Certificate Examination should be abolished, and that, instead, two systems of examination should be established, one internal in individual schools and the other external, organized by existing external examining bodies. The novel features of the proposed system are the freer choice of subjects and the considerable reduction in the number of compulsory external examinations.

There are many who feel that the new system, unless very wisely applied, will be no improvement on the old in that it appears to have been influenced by a desire to avoid dislocation in the present internal organization of Secondary Schools, a criticism of which is that both in the curriculum and in the spirit of teaching they are too much governed by the Certificate Examinations, which have become an end in themselves instead of an adjunct to a broad education.

One of the Associated Iliffe journals, *Iron and Steel*, approaches this problem from the angle of the metallurgical industries, but we feel that experience in the aircraft industry has been very similar. The root of the trouble appears to be not so much that the defects were in the examination system as it was originally intended. Rather that in the course of time it has become used for the dual purpose of a school examination and University entrance and scholarship qualifications.

The intense specialization which is now universal in Secondary Schools in the sixth form is due to the ways in which Universities have used the Higher Certificate Examination as a basis for exemption from first-year courses and for the award of scholarships. It is quite common for boys who compete for scholarships in science to spend their last three years at school in the study of science, having got the School Certificate behind them before they are 16. Many of these boys are among the brightest, and their general education in the schools is thus cut off at an early age because of University requirements. The effects are felt in industries which employ graduates, and it is not at all uncommon to hear the complaint that University graduates are ill-educated specialists who cannot even write good English.

The best interests of students would, we feel, be served by a new matriculation examination in which a greater number of subjects would be required, but necessarily at a somewhat lower standard in individual subjects, the pupils to continue their studies on a broader basis during the later stages of their school career. For the award of scholarships, and exemptions from first-year courses, limited specialization might be needed, but it should be substantially less than that required at present.

Progress

OPERATIONAL requirements have changed, and the Vickers-Supermarine Seagull described in this issue will consequently not now be used for its initial purpose of spotter-reconnaissance work but for air-sea rescue duties. That fact does not, however, detract from the technical interest of the design, which is as fine an example of progress as could be found anywhere.

The comparison given in the article between the Seagull of twenty-five years ago and the modern amphibian is illuminating, more especially if one remembers the difficult specification to which the latest type was designed. An amphibian is a problem in itself, but this one had originally to be suitable for operation from

carriers, which meant that the wings must be capable of being folded. The complications involved were multiplied by the fact that, to get the desired performance, a high wing loading was unavoidable, and this in turn meant slots and flaps. To give a good view for landing-on and for improving take-off and alighting on the sea, variable incidence was introduced.

All these problems might well have daunted a less determined design team, but Mr. J. Smith and his staff were not deterred by the difficulties, and the new machine is something of an engineering triumph. From the aerodynamic point of view, the most outstanding feature is the very remarkable speed range; 54 m.p.h. to 260 m.p.h., or nearly five to one. To have combined, in an amphibian, the aerodynamic cleanness needed to give that top speed and a maximum lift coefficient of something like 3.5 is a remarkable testimony to careful design and to skilful use of slots and flaps.

Civil Aviation

LORD NATHAN, Minister of Civil Aviation, often has to suffer good-natured leg-pulls for the number of committees he has set up, and the announcement of yet another, in the form of an advisory council of ten, will doubtless be used by his critics, who will not be slow to point that the Ministry is expanding at a time when, unfortunately, civil aviation is contracting.

We feel that the new council of ten, which is being modelled on the Air Council so far as consistent with the two different spheres of activity, should be welcomed. The Ministry of Civil Aviation covers a wider field than is generally realized, and there is a real need to co-ordinate all its many activities. Watertight compartments are never helpful to the efficient working of any business, and in civil aviation it is even more necessary than in most that decisions in one branch should not be made until their effects and repercussions in the others have been taken fully into account.

There are a sufficient number of problems to be faced, both long-term and short-term, and the economic situation does not help to make their solution any easier. The whole picture has changed and is still changing. The fact that, so far as the Corporations are concerned, we are not and cannot fully be masters in our own house, owing to international questions and the need for agreements, adds to the complications.

In the matter of airports, delay is caused by the need to obtain international agreement on the types of navigation and landing aids to be standardized. And even in matters where we do have a free hand, such as the encouragement to flying and gliding clubs, Lord Nathan will have a difficult task in getting much more than "token" assistance out of a hard-hearted Treasury.

If the new advisory council can help the Minister to reach decisions more quickly, it will be well worth while.

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Forthcoming Events, page 674.

AMERICA'S BRAB: The impressive scene as the Convair XC-99 came in to land after its maiden flight. It is estimated that 90,000 spectators turned up at Lindbergh Field, San Diego, to watch the event. A photograph of the pilot's cockpit appears on page 654.

With the Fowler flaps, but not the split flaps, lowered, the Pioneer is seen on test, piloted by Mr. R. C. W. Ellison.

Prestwick Progresses

Flight Tests of the Pioneer : Transport and Tutorial Developments

DIVERSITY and enterprise characterize activities at Prestwick, and on our visit for the recent celebrations of seven years of transatlantic flying to the great Scottish base (reported in *Flight* last week) we made a point of seeing as much as possible of the work in hand. First we called on Scottish Aviation, Ltd., founders of Prestwick airport, the directors of which are the Duke of Hamilton, Sir Ernest Lemon, Mr. D. F. McIntyre and the Earl of Selkirk. General manager of the aircraft factory is Mr. R. C. W. Ellison, chief designer Mr. Robert McIntyre, sales manager Mr. S. M. Owen, commercial manager Mr. J. B. Erskine, and works manager Mr. F. W. Hopkins.

Our primary interest here was in the Pioneer. Since its first flight on November 5th, Mr. McIntyre told us, the first prototype of this light single-engined transport—the subject of a technical description in *Flight* of October 2nd—has completed over 30 hours in the air, with Mr. Ellison as test pilot. Naturally a great deal remains to be learned from such a new aircraft, embodying, as it does, very advanced high-lift devices, but already a cruising speed of over 120 m.p.h. has been established, and in a 10-m.p.h. wind landing runs of about 30 yards have been observed. The initial rate of climb is over 1,000 ft/min and performance data issued at Radlett are already invalidated. Stalls will not be attempted until a tail parachute is fitted, in conformity with regulations, but on more than one occasion Mr. Ellison has flown the Pioneer along the runway with 35 m.p.h. on the clock. The normal approach is made in a nose-down attitude, and the length of the landing run appears to be unusually insensitive to approach speed. In the Prestwick control tower Mr. Bulstrode, the A.T.C.O., is finding difficulty in determining when the Pioneer officially "arrives."

Although, for the present at least, a production order from the Ministry of Supply is unlikely, due to considerations of national economy four other Pioneers are going

A classroom at Air Tutors, where Mr. G. A. Oldfield is Chief Instructor.

Prestwick Progresses . . . . .

through the shops. In these machines, structure weight is being progressively reduced, though even in the lightest version strength will be such that the all-up weight—at present 3,780 lb—could easily be raised to 4,250 lb. The Pioneer is, in fact, robust enough to operate at 5,450 lb, some components having shown a strength 50 per cent over the calculated. Mr. McIntyre has considered the possibility of installing an Armstrong-Siddeley Cheetah engine and making provision for a fifth seat at the rear of the cabin. Float and ski versions are projected and, should the former be undertaken, the designer's experience with Short Bros. and Hawker Aircraft (on the Dantorp and Hoopoe floatplanes) would prove invaluable. Consideration has also been given to a less expensive version of the Pioneer, having no Fowler flaps.

A Nene-Lib.

One saw specifications and drawings of a very different project, undertaken by Mr. McIntyre and his technical staff late in 1944. This was to be an adapted Liberator for research and development flying with the Rolls-Royce Nene turbo-jet. Due to the method of undercarriage retraction on the Liberator, four Nenes could have been relatively easily installed in place of the Twin Wasps, and were estimated to give a cruising speed of 400 m.p.h. at 40,000ft.

Scottish Aviation, Ltd , have had very wide experience of Liberator modifications and conversions, and the operational branch, Scottish Airlines, are succesfully operating five converted "Libs"—three 24-passenger machines, a passenger/freighter and a freighter. Without its turbo-blowers the adapted Liberator is proving very economical in service and one machine of the type has flown non-stop from Cairo to Prestwick in 15 hours, carrying 24 passengers and 600 lb of baggage. On arrival, 760 gallons of fuel remained. Consumptions as low as 1.56 a.m.p.g. have been recorded. One Liberator is now being converted as a tanker for flight refuelling.

Wartime experience in converting Dakotas as "flying caravans" for Allied commanders has been the foundation for a long series of Dakota conversions for British and foreign operators. For the present, the principal source of Dakota supply is the U.S. War Assets Administration, the sale of the aircraft being handled by the U.S. Foreign Liquidation Commission. As the main storage unit for American aircraft is only 30 minutes' flying from Prestwick, Scottish Aviation are able to submit rapid reports to clients on the general condition of airframes and on running times on engines.

Converted and overhauled Dakotas, totalling over a hundred aircraft, have been supplied to the following operators: K.L.M., Aer Lingus, Danish Airlines, Fred Olsen, Portuguese T.A.P., Swissair, Sabena, B.A.S., Icelandic Airways, Airways (India), Ltd., Air Transport Charter (Channel Islands), Ethiopian Air Lines, Westminster Airways, Belgian Air Force, B.E.A., Swivewright Airways, Ltd., Syrian Airways, T.W.S., and the U.S. Navy. Work is in hand at the moment for Cyprus Airways, Westminster Airways, Hornton Airways, Syrian Airways, Ciro's Aviation, Air Algerie, Aigle Azur, Air Nolis, Alpes-Provence, Soc. Transatlantique Aerienne and Laso-France. The price of a fully overhauled and converted Dakota ranges from £16,000 to £20,000. Craftsmanship of an exceptionally high order has gone into a "V.I.P. Executive" Dakota for the Prince Regent of Belgium, and another for the Maharajah of Baroda.

Military aircraft which may be seen undergoing modification or repair at Prestwick include Lincolns, Walruses, Sea Otters, Expeditors and Travellers. New engine-overhaul shops are nearly complete and await only test equipment. Work here will be concentrated initially on the Pratt and Whitney Twin Wasp R-1830 range. A very active aircraft servicing organization attends the stream of transatlantic aircraft passing through Prestwick—D.C.4 Ms of T.C.A., the B.O.A.C. and K.L.M. Constellations, and DC-4s of A.O.A. and S.A.S. Repair, overhaul and servicing facilities include electrical and instrument shops and radio and hydraulic departments.

For an outline of present and recent activities of Scottish Airlines, we sought the general manager, Mr. J. A. Dobson. The commercial manager of this operating company is Mr. J. Taylor, and the chief pilot Mr. A. J. Cormack. An impressive fleet of aircraft is available: the five Liberators already mentioned; eleven passenger-

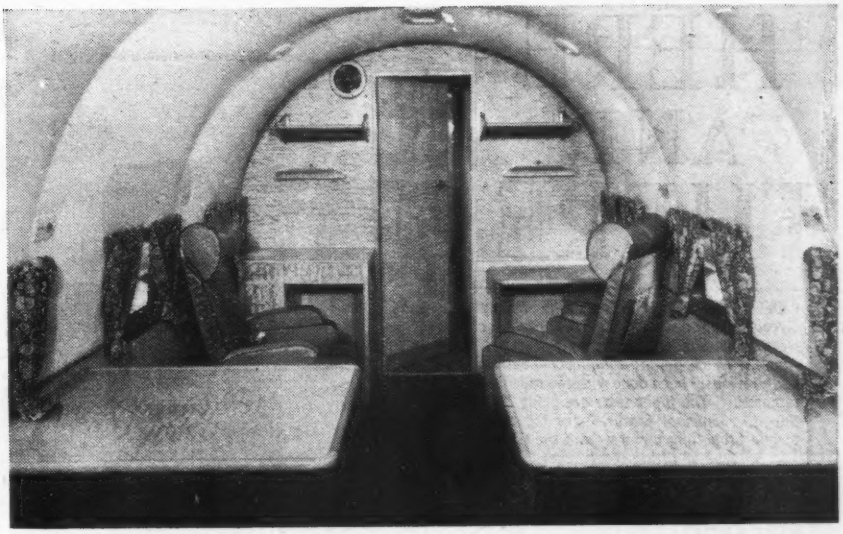
Note, in these new ground views of the Pioneer, the area of the flaps, the clean design of the fuselage and the single main bracing strut for each wing.

carrying Dakotas; two Dakota freighters; one Fokker F.22 (used principally for summer joy-riding); a Proctor for instrument-rating (following American practice, the company passes-out its own pilots); and two other Proctors for communications flying. This year, to date, Scottish Airlines have flown 1,600,000 miles, carried 38,000 passengers, 70 tons of freight and 15 tons of mail. Forty pilots, five navigation officers, fifteen flight engineers, fifteen radio operators and eighteen hostesses are employed.

Liberators are used for the weekly service to Reykjavik on behalf of Icelandic Airways, and for long-range charter flights, the latter including the transport of seamen over the North Atlantic, and trips to Johannesburg in three days. Under charter to B.E.A., Dakotas belonging to the company have this year maintained the following services: Glasgow-London, Aberdeen-Glasgow-London, Prestwick-London, and Prestwick-Belfast, and on behalf of the Cobeta concern are now flying on the Prestwick-Manchester-Brussels run. Machines have also been chartered to K.L.M. for the Prestwick-Amsterdam service and to Air France (Prestwick-Paris). During the summer, holiday cruises were undertaken to Le Zoute and the Isle of Man.

One of the company's latest enterprises is in conjunction with a Greek company—Hellenic Airways—further details of which appear in the Civil Aviation News feature of this issue. Scottish Aviation has a financial interest in the new company, and aircraft, crews and "know-how" will be made available in order to get internal and external services under way.

The Scottish company runs its own instrument-flying training section, in charge of Mr. Fyfe Burns, M.B.E., in whose absence the School was shown to us by Mr. S. Linnie. Considerable pride is rightly taken in the possession of a unique "twin-engine" Link trainer, the adaptation of which from a standard "Link" has been entirely undertaken in the School. Throttles, r.p.m., oil-pressure and oil-temperature indicators are duplicated, and an "engine cut" can be effected by external means, whereupon the pilot must take appropriate action. Radio aids and an S.C.S.51 box are available to him, and even now all possible equipment has not been installed; for example, airscrew feathering buttons are foreseen. In addition to a "single-engine" Link trainer, the School possesses Synchrophone equipment for instruction in the use of S.C.S.51, S.B.A. and radio range. Some important technical developments may be expected before long at this resourceful School.



The ultimate in comfort and convenience—a Dakota lately converted for the Prince Regent of Belgium. Another Dakota has been prepared for the Maharajah of Baroda.

A branch of Scottish Aviation known as Air Tutors is responsible for training pupils for their pilots' and navigators' licences. Mr. G. A. Oldfield is the chief instructor, and, in addition to classrooms, there is a demonstration room with synthetic Gee equipment. Postal courses are available, but students attending the School have the advantage of contact with the everyday activities of a great airport.

In collaboration with Mr. Leslie Irvin, the directors of Scottish Aviation have founded Irvin-Bell Helicopter Sales, with Wing Cdr. N. J. Capper in charge of sales and training. Pilots of B.E.A. have already received tuition.

M.C.A. activities, under the Airport Commandant, G/C. J. A. McDonald, are already familiar to regular readers, who are also conversant with the work of Transatlantic Air Control, for which Mr. G. A. Douglas is responsible, at "Redbrae."

THE F.B.I. REGISTER IS OUT

THE first post-war edition of the "F.B.I. Register of Manufacturers"—the only complete guide to the Members of the Federation of British Industries, their products and services—is now available. Published jointly by Kelly's Directories, Ltd., and Iliffe & Sons, Ltd., the 1947-8 edition lists over 4,500 of the foremost manufacturing organizations in Great Britain, and includes much entirely new information designed to appeal specifically to foreign buyers. Of particular importance is a Products and Services Section, with all F.B.I. members classified under 5,250 headings; thus facilitating the rapid identification of supply sources; an Address Section comprising an alphabetical directory giving complete information on every member; and a Brands and Trade Marks Section enabling buyers to trace the makers of branded goods. These are supplemented from the overseas reader's viewpoint, by additional reference facilities in French and Spanish.

Produced under an arrangement with the Federation of British Industries, the 1947-48 F.B.I. Register will provide valuable support for the export drive, its world-wide distribution including the principal buyers, importers and shipping agents throughout the world; British Consuls and Commercial Attachés abroad; Trade Commissioners; Chambers of Commerce, etc. Distribution is being handled by Kelly's Directories, Ltd., 186, Strand, London, W.C.2, from whom copies are obtainable, price 2 gns (special terms to F.B.I. members).

GLASS PRODUCTS IN AIRCRAFT

FIBREGLASS, LIMITED, of Firhill, Glasgow, N.W., was started by Chance Brothers, as long ago as 1930, but many of its most interesting developments and products were necessarily kept secret during the war years. The company first manufactured glass fibres for heat and sound insulation and this line has been followed and developed, special superfine fibres being produced for use in aircraft. Almost every industry now finds an application for glass products, and of particular importance are the yarns, paper and cloths supplied for electrical insulation.

Speaking at a cocktail party given on December 2nd, Sir Hugh Chance, chairman, indicated the great increase in output and application of Fibreglass products. The company now has three additional factories, two more in Glasgow and one at St. Helens, and the processes of the Owens-Corning Fibreglass Corporation of America have been used under licence since 1938 when the company entered the textile field. At this time also Pilkington Brothers became actively associated with the venture in textiles. Examples of a variety of Fibreglass products were displayed on the occasion of the party.

HERE AND THERE

"OFF THE STRINGS": The Fairey Gyrodyne made its first free flight at Hestan last Sunday, piloted by S/L. B. H. Arkell. Much ground-running of the rotor had previously been done with the machine tethered. The flight tests are being continued. Unusual features are the anti-torque propelling airscrew and the Cierva type of tilting rotor head.

R.Ae.C. Seeks Fuel Tax Relief

PROPOSALS for the ending of the tax of 9d a gallon on aviation petrol are to be placed before the Government by the Royal Aero Club. It will be pointed out that the tax is a severe handicap on private flying and that its removal is inseparable from any plan to save the flying clubs, whose existence is at present threatened.

Our Aircraft Exports

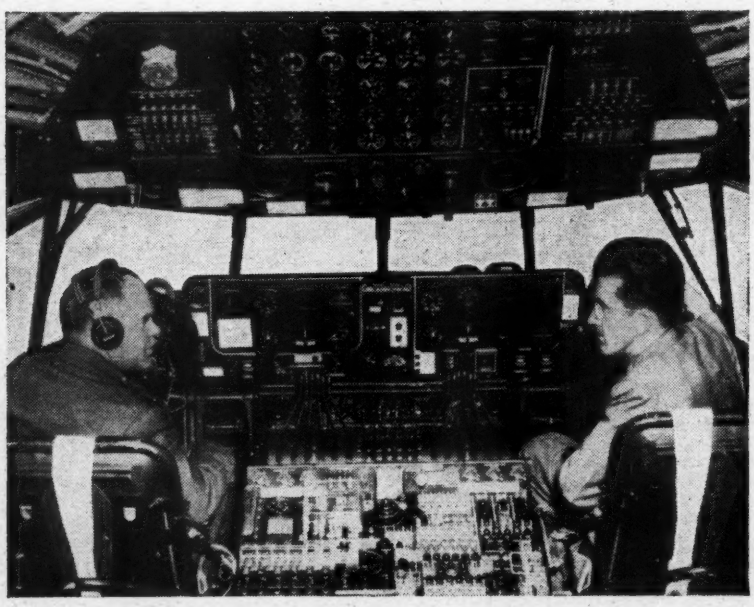
EXPORTS of aircraft from January to October, 1947, from the U.K. to the Dominions amounted to £2,094,000, according to the Board of Trade. India and Pakistan accounted for £654,000 of this. During the same period, aircraft sold to the Argentine were worth £2,579,000 and to Turkey, £1,601,000. Total sales to foreign countries were £8,892,000, including £1,000-worth each to Saudi Arabia, the U.S.A. and Uruguay. The grand total, all countries, is thus nearly £11 million.

Cruising at 264 m.p.h.

OWING to an error in transcription the maximum weak-mixture cruising speed of the Ambassador was given last week as 204 m.p.h. This should, of course, have been 264 m.p.h.

Johannesburg Airport Opened

FIELD-MARSHAL MONTGOMERY officially christened the new Jan Smuts airfield at Johannesburg on December 10th. When it is completed in 1952, the airfield is expected to have cost £3,000,000. It will have one 3-mile and two 2½-mile runways designed for aircraft weighing up to 200 tons. General Smuts flew home from London for the ceremony.



HALF AS MANY AGAIN: As might be expected, the engine instruments of the big six-engined Consolidated-Vultee XC-99 make an imposing display. This photograph, taken during the first flight, shows Mr. R. R. Rogers, chief test pilot of the company, at the controls, with the flight-engineer on the right.

Death of Mr. Leonard Newall

WE regret to record the death of Mr. Leonard Newall, chief development engineer of Percival Aircraft, Ltd., at the age of 54. He started his career with Vickers after the 1914-18 war, was with Handley-Page as assistant chief designer, worked with Armstrong-Whitworth on the development of the Ensign, became chief designer to Airspeed (1934), Ltd., in 1936, and joined Percivals in 1944.

No Snow on Boots

THERE have been questions in Parliament about foreign countries providing armed guards for their aircraft "at Northolt airfield or any other airfield without reference to the British authorities in charge of such airfields." Mr. Lindgren, Parliamentary Secretary to the Ministry of Civil Aviation, said that the last case had been the guarding of the aircraft which brought the American Secretary of State to the Foreign Ministers' Conference by two members of the crew armed with automatic pistols. That was in October, 1947. Sir Ralph Glyn asked that the Parliamentary Secretary should point out to our friends in the U.S. that it was unnecessary to bring people to guard their aircraft on British airfields, and Mr. Stokes asked him to explain how two men managed continually to guard an aeroplane. Colonel Hutchison was interested in the circumstances in which, he understood, a guard of armed Russian soldiers was mounted over Russian aircraft at Northolt, but Mr. Lindgren said that he knew of no such guard, and that they had no snow on their boots either.

Indian Evacuation

HEAVY passenger loadings of aircraft concerned in the Indian-Pakistan refugee evacuation operations by B.O.A.C. have been referred to. Figures for a Wayfarer have come to hand; in nine days' flying, this aircraft, stripped of seats and other interior fittings, carried 1,105 evacuees and their baggage (44 lb per person allowance) without ex-

ceeding its all-up weight of 37,000 lb. The machine was operated for B.O.A.C. by British Aviation Services.

Sheep by Air

AN unusually large consignment of stud sheep, 254 of them, was freighted in seven batches by Australian National Airways from Tasmania to Melbourne for a Show. Transverse partitions were fitted in the aircraft, to form pens, and the sheep were loaded direct from lorries by a short gangway.

Dorval Association

AN association has been formed to link together those who flew from the wartime Atlantic Ferry airport of Dorval, Montreal. It is to be called the Dorval Association, and the organizing secretary is Mr. Robert Russell, Douglas Lodge, Bothwell, Glasgow. The object of the Association is to re-unite all those of every nationality who worked together at Dorval and became internationally minded. It is planned to issue a bulletin dealing with the latest developments in Atlantic aviation and giving news of members.

Aries II for South Africa

AFTER a research and liaison tour in Australia and New Zealand, the R.A.F. Lincoln bomber *Aries II* has left Australia for South Africa. It is expected that the interesting compass deviations studied on the outward flight will be encountered again on this journey, and there has been talk of a new type of direct-reading compass being evolved. *Aries II*, which is commanded by G/C. Veille, arrived at Darwin, in the early stages of the flight, within one minute of E.T.A.

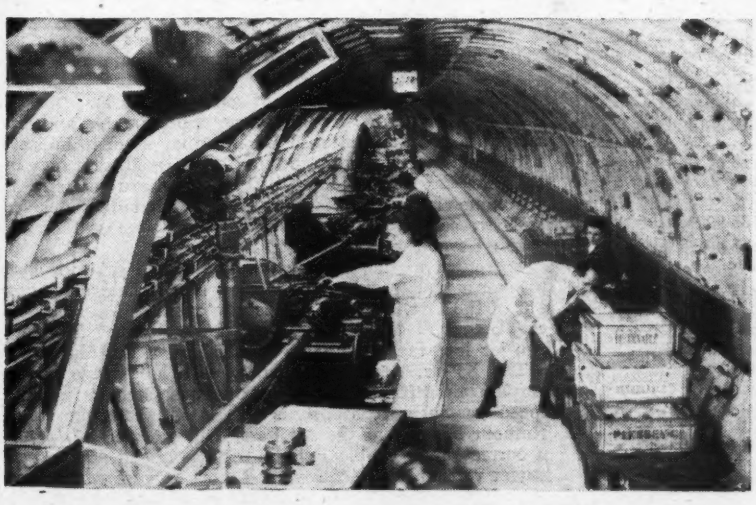
Instruments on Show

AN exhibition is being held at Brettenham House, Lancaster Place, Strand, W.C.2, from January 20th-31st to introduce the Cintel range of industrial electronic instruments made by Cinema-Television, Ltd., Worsley Bridge Road, Lower Sydenham, London, S.E.26. They will include a metal-detector, a 30,000 per minute counter and oscilloscopes.

RAM JET HELICOPTER. In this picture the size and mounting of the ram jet units used on the McDonnell experimental helicopter can be seen. Weighing 310 lb, the machine has a disposable load of 300 lb and a forward speed of 50 m.p.h.

Short of Duration

WHEN Dr. John Homewood, an Australian flying dentist who serves towns with no dentists of their own, arrived at Darwin on November 22nd, he was warned off by the Control Officer to permit a Lancastrian to land. He flew off and did not return, and as he was believed to have only one hour's petrol a search was made, which revealed him in a swamp 12 miles away. He and his passenger were uninjured, but the problem of the extraction of his Tiger Moth remained.



AIRCRAFT FACTORY BECOMES TUBE RAILWAY. The Plessey Co.'s wartime factory in part of London Transport's Central Line tube railway extension has now reverted to its original purpose, and the first trains run tomorrow. The picture shows the light-gauge line that was used in the factory.

News in Brief

One feature of the extensions and improvements to Sola airport recently approved by the Norwegian Parliament, to fulfil the requirements of S.A.S. and D.N.L., is a special hangar for Boeing Stratocruisers.

* * *

In the December issue of our associated journal *Aircraft Production* is a complete illustrated description of the series production of Cirrus engines at the Brough works of Blackburn Aircraft, Ltd.

* * *

Five Bristol Type 170 aircraft have been converted for troop-carrying in the Argentine, each carrying 35 men and their kit. The fleet is accompanied by a sixth Type 170, fitted as a workshop.

* * *

The American round-the-world flyers, George W. Truman and Clifford V. Evans, whose safe arrival in Alaska was reported in *Flight* recently, have now landed at Van Nuys, California, after a non-stop flight from Canada, and have so completed their long trip.

* * *

Mr. J. K. Redman, A.R.C.S., B.Sc. (London), A.F.R.Ae.S., of the technical department, Gloster Aircraft, has been appointed chief technician to Dunlop's Aviation Division. He had previously been with A. V. Roe and Short Bros.

* * *

Flight congratulates Mr. D. H. Cunliffe-Owen, only son of Sir Hugo Cunliffe-Owen, on his marriage to Mary Maud Redgrave at St. Mark's, Audley Street, London, on December 3rd.

* * *

An international helicopter conference, the first to be held in Scandinavia, was held in Stockholm recently. Delegates visited the Swedish Seefab factories and inspected a new type of rotor blade with light seamless steel tubing at the leading edge and light metal in the rest of the blade.

* * *

In refusing to intervene in the strike of 5,000 workers at the Ulster works of Short and Harland, Sir Basil Brooke, the Prime Minister, has stated that since the dispute between workers and management had not been brought before the agreed negotiating organization his proposed intervention would be "of no useful purpose."

* * *

Eniwetok atoll, 2,500 miles S.W. of Hawaii, is to be used by the U.S. Government as an atom bomb testing ground.

* * *

A paper dealing with marketing, industrial design and packaging was read in London recently before the Incorporated Sales Managers' Association by Mr. Richard Lonsdale-Hands, head of the firm which styled the B.O.A.C. inter-station coach and the interiors of the Tudor II, Brabazon, and Saro flying boats.

* * *

From Oslo to Shanghai via the U.S.A. is now 61 hours by air, while on the eastwards route the time required is 92 hours. The S.A.S. service to New York connects with North-West Airlines' services. There is considerable mail and passenger traffic by air between Shanghai, as a great seaport, and Norway, with its wide shipping interests.

American Newsletter

Progress Review of the "Heavies" : Fourteen Out of Sixteen Have Flown : Hughes's Gesture of Defiance

By "KIBITZER"

THE moving of the Brabazon I to its final assembly hangar has aroused a good deal of interest here. This interest is more than passing. So far America has had the monopoly of the really big aircraft of 150,000 lb A.U.W. or more, and the amount of know-how and manufacturing and flying experience that they have amassed is considerable. Everyone, therefore, is most anxious to see how the British get on with their first venture into this field. The fact that there is no steady line of large aircraft development behind the Brabazon I has given observers here the feeling that the difficulties of such an ambitious project may have been under-estimated.

There have been too many headaches here with big aircraft for them not to know what a tremendous job it is, and the English press has sometimes given the impression (obviously not one that is shared by the manufacturer) that "Well, this is just another aircraft, a bit bigger, perhaps, but we've made the Lancaster and the big boats work, and this will do the same." But the question remains in their minds, "Will it, and how long will it take?" And it is the answers to those questions that the Americans are anxious to see.

The history of the development of large aircraft in this country may not be as widely known in England as it should be, nor the amount of headway that has been made. It might be interesting, therefore, to give a very brief survey of past and present, and perhaps future, types. In 1940, although there were several large aircraft on the drawing boards, or in the planning stages, the first one to come to anything was the Douglas B.19. This machine, which had a maximum permissible overload weight of 164,000 lb, was the grand-daddy of them all, and from it stemmed, if not actual aircraft, certainly a tremendous lot of knowledge that was afterwards applied to other types. It flew first in 1941, and so far as I know it is still going strong, having been used as a research aircraft for engines, armament, accessories and new aerodynamic ideas. As an Air Force "test bench" it would be most interesting to know the research history of this machine, for its value should not be underestimated.

Subsequent to this development both the U.S. Army and Navy went ahead with their respective programmes, which called for large bombers, transports and flying-boats. Only during 1946 and 1947 has this programme come to complete fulfilment, and, as the accompanying table shows, fourteen out of sixteen types over 115,000 lb. have now flown—remarkable achievement! When studying this list it should be appreciated that the weights shown are only approximate, and in most cases represent the design maximum permissible overload condition, which is not necessarily the weight at which the aircraft has been flown. No attempt has been made to include anything of under 110,000 lb A.U.W. and there are probably sins of both omission and commission in this list, but it is fairly representative of the picture here today.

Aircraft	Builder	Type	Approximate : max. permissible A.U.W.(lb.)	Remarks
XF-12	Republic	Photographic	116,000	flown
B-32	Consolidated	Bombers	120,000	flown
Stratocruiser	Boeing	Transport	135,000	flown
B.29 / B.50	Boeing	Bombers	138,000	flown
D.C.7	Douglas	Cargo Transport Cargo	145,000	flown
Mars	Martin	Flying Boat	145,000	flown
B.52	Boeing	Bomber	unknown	—
B.47	Boeing	Jet Bomber	163,000	about to fly
B19	Douglas	Research	164,000	flown
Constitution	Lockheed	Navy / Transport	184,000 / 194,000	flown
B-35 / B-49	Northrop	Bomber	210,000 / 220,000	flown
B-36 / XC-99	Consolidated	Bomber / Transport	300,000	flown / flown
Hughes	Hughes	Flying Boat	400,000	flown

What the future holds is another matter. Rumour is always busy describing new types, but details are hard to get, and there are probably several aircraft given in the second list which were merely a gleam in their designer's eye, and which never got further than the design study stage. If the ones I mention are amongst those haunting some aeronautical limbo—a region that must, by now, be well stocked with fascinating ghosts!—I must blame it on the clouded crystal ball department. In any case the situation over here today is such that it seems very doubtful if any manufacturer would be prepared to go ahead and build a big aeroplane without a hard and fast guarantee of orders, and such orders would have to come from the government.

FUTURE HEAVIES LIGHTER

THOSE, then, are the types that the Americans have now. But what of the future? The answer as I have already said is that one does not know, for manufacturers are inclined to be oyster-like about even such plans as they had in the past, for these are days of severe competition. But at the risk of sticking my neck out more than usual, and perhaps drawing some quite unjustified conclusions from things I have heard, it may be that the following were, at one time or another, considered as possible types:

Lockheed six-engined jet transport of some 140,000 lb.
Boeing commercial flying-boat of some 150,000 lb.
Consolidated cargo-cum-transport boat of some 150,000 lb.
Martin commercial boat of some 165,000 lb.

These figures are frankly very approximate, and are merely of academic interest because they seem to indicate a tendency to return to somewhat lower weights. It may be that the day of the 200,000 lb.-and-upwards aircraft as a commercial project is, if not over, definitely delayed until we can get more data from such types as the Brabazon I and the Consolidated XC-99.

To return to the existing types, it would take too long to give a blow-by-blow description of all these machines, but of the first four the B.32 is now more or less obsolete; the B.29 and the P.W.-engined B.50 are the Standard non-jet long-range bombers of the American Air Force.

The XF-12, designed primarily as a long-range photographic aircraft and subsequently considered as a high-speed passenger transport, is still in its prototype stage. Rumour has it that the Air Force will order a few. This, if correct, may enable Republics to go ahead on the passenger version, specifications and mock-ups for which have already been submitted to some of the airlines. As a matter of fact, if there had not been the general downward trend in both airline receipts and manufacturers' profits during 1946 and 1947, this machine might have gone into production as the first really fast long-range transport.

American Newsletter . . . . .

As it is, I doubt if we shall now see it as such, anyway with its present power plants.

In the transport category the history of the Stratocruiser and its development from the B.29 is already known, and over 100 hours of flight testing have so far been completed on the two prototypes. The first Atlantic proving flights for this machine are expected early in 1948. The D.C.7, of which only a few are being built for the Air Force, was a straightforward development of the D.C.4 and D.C.6 series, and the fact that only a small number are under construction is due more to tactical requirements than to the efficiency of the machine. Much the same applies to the Glenn Martin Mars. This was built to U.S. Navy and Martin specification during the war, and after a rather unfortunate series of accidents during its early flight testing became a wonderful work-horse, carrying passengers and cargo with great regularity across the Pacific. When the war ended, quite a number of these were on order, but this order, like so many others, suffered cancellation, and there are probably not more than half a dozen of them in use today. This machine served a good purpose inasmuch as it demonstrated the reliability of over-water cargo aircraft, at least in areas like the Pacific.

The Lockheed Constitution is another Navy project (although at the time of its building, Pan American Airways had more than a passing interest in its construction). It was always recognized that, until airscrew turbine power units were available, this could not possibly be an economical aircraft, and its present four P. & W. 4360 engines are far too small for its designed all-up weight, although it has flown very successfully at lower weights, believed to be 160,000 lb. All the same, it seems doubtful if further aircraft of this type will be built. The "Flying Wing" M.35 and its jet-engined brother the B.49 are both military projects. Both have flown successfully, and reports say that but for continual airscrew trouble on the B.35, much test flying would have been completed.

Incidentally, to anyone who knows the Northrop Airfield, the use of this for the first take-off of such a radically new design might seem unduly hazardous—but the firm were quite confident and both initial flights were perfectly successful—although the destination was the Army base at Muroc Lake and not back to Northrop Field.

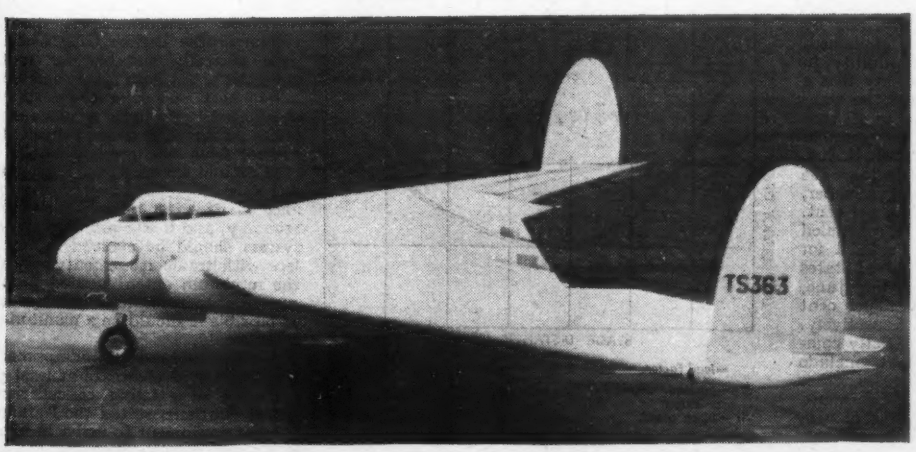
It is, however, the last three machines on the list which are by far the most interesting from a size point of view The B.36, designed and built by Consolidated-Vultee, was first put down on paper during the war, and at that time the specification looked nothing short of fantastic. Photographs and major details of the machine have appeared in all the aviation papers, and a certain amount of test flying has already been completed. At present fitted with six Pratt and Whitney 4360 Wasp Major engines, driving pusher airscrews through shafting, it is a design that can hardly come to its full importance until airscrew-turbine engines are available. Not unnaturally, the juxtaposition of flaps and airscrews has presented the designers with some awkward problems, which they may not yet have overcome, but the fact remains that the XC-99, which is the Army transport version, has now made its maiden trip out at San Diego airport, so there cannot be much wrong with it. Although Consolidated have had plenty of experience in the building of large aircraft, to have been so successful with these, the world's two biggest landplanes, reflects great credit on all concerned.

HUGHES NEWS

LAST, but most certainly not least on the list, is the 320ft-span Hughes flying-boat, and if there is anyone who thinks that a machine designed for an overall weight of 400,000 lb isn't big, they had better take a look at this one! As a matter of fact, there has been plenty of discussion here about this boat, for its conception, design, cost, and general existence have been the subject of a Congressional enquiry. This, even if it failed to pin political chicanery or financial finagling on to the people it originally suspected, did unmask some most unfortunate abuses of position in high-ranking places. At one time the enquiry also delighted the public by exposing a detailed analysis of a most colourful expense account which was submitted by one of Hughes' chief employees. Later on the audience rose in their seats to cheer a battle royal between Hughes and a leading member of the investigating committee—out of which the Senator concerned emerged in rather a battered condition.

Hughes himself, apparently vindicated, stalked out of all this as tough and unrelenting as ever, got into his private aircraft and flew himself back to the West Coast, where he proceeded to take his big boat off the water during its preliminary taxying tests! Admittedly it was light (for its size), probably around 275,000 lb, but this gesture of defiance was not lost on the American public. The wisdom of so-doing seems doubtful, but Hughes is not a man who does things out of bravado, and he must have given due consideration to what he was about to do. As a matter of fact, one of the reasons that the flight testing was so long delayed was that the entire operation of the controls had to be redesigned. The original system was found to be so heavy, even in the dock, that a new power system had to be designed and fitted before even water-taxying could be considered.

What will happen to these really big aircraft is anybody's guess. My own personal opinion is that, except for certain "prestige" operations, such big sizes are unlikely to make any money for their operators, and I would (apart from military requirements) put my money on the 150,000 lb aircraft rather than on the mammoth boat or landplane.



BACK HOME

On Monday, December 1st, the Nene-engined A.W.52 flew from Boscombe Down to the Company's airfield at Bitteswell. Before landing, the aircraft flew over Coventry and over the Armstrong Whitworth works so that many of those associated with its design and construction might for the first time see it airborne. Although unusual, if not almost grotesque on the ground, the 52 was described by witnesses as beautiful in the air.

Civil Air Operations

An Appreciation of the Long-term Problems to be Faced by Airline Operators and Aircraft Designers

MR. N. E. Rowe, C.B.E., Vice-President of the Royal Aeronautical Society, has been Controller of Research and Long Term Development in the British European Airways Corporation since April 1945. He entered the Air Ministry in 1924, became Deputy Director (Aircraft) in 1940, Director of Technical Development in 1941, and Director General of Technical Development in the Ministry of Aircraft Production in 1944.

INTRODUCING his lecture to the Royal Aeronautical Society on December 4th, Mr. N. E. Rowe said that the subject was one of many facets and one of no little contention, with widely significant variations in different parts of the globe and depending greatly on individual views of the future of air transport as a whole. He consequently limited himself to three broad main problems which covered numbers of subsidiary matters of great significance.

The lecturer did not consider safety itself as a problem but as a necessity, and his problems concerned reliability, including regularity, safety in the context of economy, and economy of operation. Under the first heading of reliability, he placed precise navigation in all weather conditions, approach, landing and take-off in blind conditions, and aircraft flying qualities as the main problems. Under safety with economy he thought that air traffic control, design problems and crew fatigue were the main considerations; and for economy of operation he placed first of all the definition of future requirements and the problem of forecasting traffic, the development of new types of aircraft and methods of maintenance.

To restrict himself to immediate problems was not his intention since the situation in this country was due largely to the aftermath of war and it would not be representative of civil air operation generally. There could be no doubt, he said, of the future growth of air transport both of passengers and cargo, especially of the latter, and there was no indication that the rate of increase of traffic was showing any sign of slackening. Such growth had brought problems in operating speeds and hence frequencies which would steadily increase, giving rise to major air traffic control and airport problems. He also considered that the drive for economy would be greatly intensified, compelling designers as well as operators to new solutions of existing problems; and that cargo-carrying would advance rapidly and require specialized operating organization, design and airports. There would also be a growth in helicopter operations for short stages. It was important, he said, that the assessment of the long-term problems should be reasonably correct since the solution of short-term problems might be merely palliatives instead of being the early stages in the answers to the long-term problems.

Average cancellations in B.E.A. Continental Division for period October, 1946–September, 1947.

Reliability and Regularity

A major problem of air transport today was its unreliability, and by unreliability, Mr. Rowe explained, he did not mean susceptibility to accidents but an uncertainty that a scheduled operation would be completed according to plan in all conditions. He quoted the cancellations, due to weather, of B.E.A. Continental services during the twelve months ending September, 1947, as an average of 5.4 per cent. The average of the ratio of scheduled miles flown to miles scheduled for four major lines in the United States for the twelve months ending June, 1947 and 1946, was 94.8 per cent and 95.6 per cent respectively. These figures were not strictly comparative as they might include irregularities due to causes other than weather. They did show, however, what had been achieved, and also the need for improvement. Assuming that irregularities occurred mainly in bad weather conditions, a standard of 98 per cent regularity would seem to be reasonable.

In addition to weather, unserviceability due to mechanical failure also caused irregularity, but that was a problem of design and maintenance and called for energetic action by all concerned. A palliative was to hold more aircraft in reserve, but that was uneconomical and increased the chances of failure. Referring to punctuality, he said that during a period of twelve months ending July this year, 8.9 per cent of services in B.E.A. Continental division were over two hours late, the greater proportion of which were due to weather. Data for express trains in this country showed 4.5 per cent of services to be similarly affected in September, 1947.

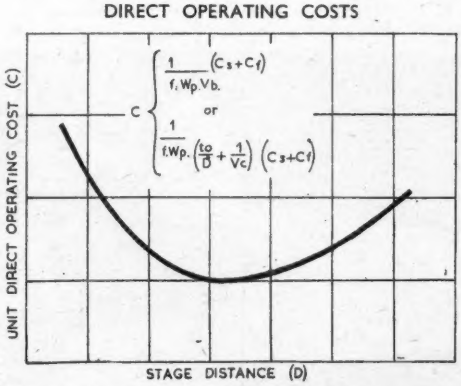
Mr. Rowe considered the method of operation of airports to be of vital importance, and that the biggest factor affecting reliable running was the time difference between operations in clear and low visibility conditions. As an example he quoted the theoretical capacity of London Airport in 1953, which was 160 movements per hour in contact conditions and two-thirds of that in instrument conditions. It was evident that if aircraft were scheduled into airports assuming contact conditions but instrument conditions supervened, then there would be irregularity which would lead to wholesale cancellation if bad weather persisted. A primary condition for reliable running, therefore, was the scheduling of airports for instrument conditions, unless frequency of non-operation on any given route system was within the 2 per cent margin of irregularity as in the suggested standard.

Improvements would be necessary in navigation, air traffic control, ground and airborne equipment. Also more airports and a greater seating capacity in aircraft to carry increased traffic into the existing airports, would be required. More traffic, especially cargo and mail, would have to run at night, and it was necessary to have a rapid and universal international adoption of up-to-date equipment. He remarked that B.E.A. insisted at an early stage on I.F.R. schedules at Northolt.

For maximum utilization Mr. Rowe considered that scheduled airports demanded precision in the timing of arrivals and departures. It was necessary, therefore, to have precise definition of position in space and time. It was claimed, he said, that either the American omnidirectional Range system or the British GEE system were basically suitable for route navigation, but both systems needed some sort of distance-measuring equipment. In both systems aircraft movements were subject to control from the ground within a zone around the airports. Such control was of great potential importance in its effect on reliability and economy, and it was essential that a system should be evolved to interfere with traffic movements only to the minimum extent needed to ensure safety; he suggested that as far as possible it should be a monitoring system only.

A solution to the blind-approach problem would eliminate at least 50 per cent of existing cancellations out of Northolt, stated the lecturer. Present equipment to assist in blind

DIRECT OPERATING COSTS



f = load factor.
Wp = pay-load available for stage.
Vb = block speed.
Vc = cruising speed.
to = time (taxy and take-off + landing + excess in climb and glide).
Cs = fixed charges + operating costs per unit time.
Cf = fuel cost per unit time.

landings included the Instrument Landing System, which could not be considered as a final solution since the path was quite badly distorted by ground and buildings at some airfields. It was not installed in any British aircraft, nor in any aircraft operating on the European routes, and it was unlikely to be brought into general use for three or four years As a palliative the Standard Beam Approach System was being used in B.E.A Only constant practice by the operating crews could ensure regularity using such blind-approach systems, which meant that all approaches in good or bad weather should be made by instrumental means. That, then, said Mr. Rowe, was a matter for operators in training their crews.

There was, however, a prospect of solving the problem of regular operation in low visibility providing the final landing manœuvre could be made visually He suggested that the objective of research and experiment should be to modify the condition by artificial aids to make possible a visual landing.

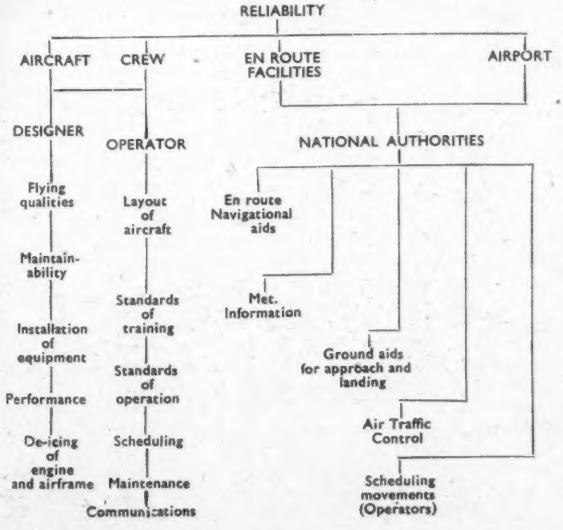
FIDO was expensive, and there was little prospect of introducing it as an aid at all airports. Experiments were going on in high-intensity lighting with some success, and there was a reasonable prospect that a system of high-intensity approach and runway lighting being developed by the R.A.E. would provide an answer in all but the thickest fog For marshalling aircraft on the airfield, Radar devices would in due course be used, combined probably with high-intensity lighting on taxi tracks in the same way as G.C.A. might be used to monitor a landing using high-intensity lighting. In his view, Mr. Rowe said, dense fog would always slow up operations, although devices might be developed which would obviate cancellations. Aircraft would then have reached much the same stage as trains and ships have at the present time.

The need to ensure first-class maintenance on the score of safety and economy was so overwhelming that it was unlikely to be a factor for reliability so far as the situation was within the control of the operator. Shortage of spares in the present difficult circumstances, however, often caused unreliability and irregularity.

Aircraft Flying Qualities

Scheduled movements in poor weather conditions taxed to the limit the Controllers and the equipment, Mr. Rowe assured his audience, and missed landings or unpunctual arrivals created a queue of aircraft in the air. It was then that the flying qualities of the aircraft and the standard of navigation were so important. The designer must consider stability and control, particularly at low cruising speed, in manual and automatic flying conditions. Good flying qualities and good layout of controls minimized fatigue, and hence design could make a real contribution to the solution of the problem of reliability. Whereas no one denied that safety was essential, Mr. Rowe pointed out that safety was not absolute in an engineering sense. The problem was to ensure the highest standards of safety as economically as possible, but that requirement had wide repercussions. For example, in design the major responsibility, he said, rested with the designer, but the operator must be consulted in order to comply with the requisite standards and to simplify pilot and crew training.

He thought that air traffic control was a good example of the problem he had in mind under the term "safety with economy." Within the primary subject of safety the system of air traffic control must be so developed as to achieve maximum utilization at airports, maximum economy of aircraft, and the best economic balance between weight complexity and cost of equipment to be employed in the aircraft and on the ground, taking into account training and maintenance related to airborne and ground equipment. Mr. Rowe thought there was a danger of accepting as inevitable a form of control which was rigid within an extended zone around busy airports. It was abundantly clear, he said, that we could not tolerate a stacking system of control with jet propulsion. In the case of jet-propelled aircraft, the cost in fuel of 15 minutes' orbiting at 3,000ft was equivalent to about 100 nautical miles in normal cruising flight.



On the subject of accidents Mr Rowe pointed out that a broad analysis showed the preponderance to be during take-off and landing. As we progressed to increased speed and height of operation there might then be a higher proportion of accidents in flight, but Mr. Rowe considered that the natural hazards of take-off and landing would always remain

That economic operation must always be the final touchstone of any fully established airline Mr. Rowe was convinced. The aircraft was the revenue-earner and if, because of its inherent qualities, its direct cost of operation was high, then no amount of administrative excellence would make operations economic The day-to-day problem was the margin between revenue-earning potential and direct operational cost.

The importance of maintenance in economic operation could not be over-emphasized with a given type in which design could not be substantially altered, but maintenance could be economical with improved facilities, and systematic organization of the work. The means of obtaining improved economy with the existing types of aircraft were strictly limited, he said. The solution to the problem must be found in the new types of aircraft, and the main responsibility rested with the operator in specifying his requirements, and he must look eight or twelve years ahead

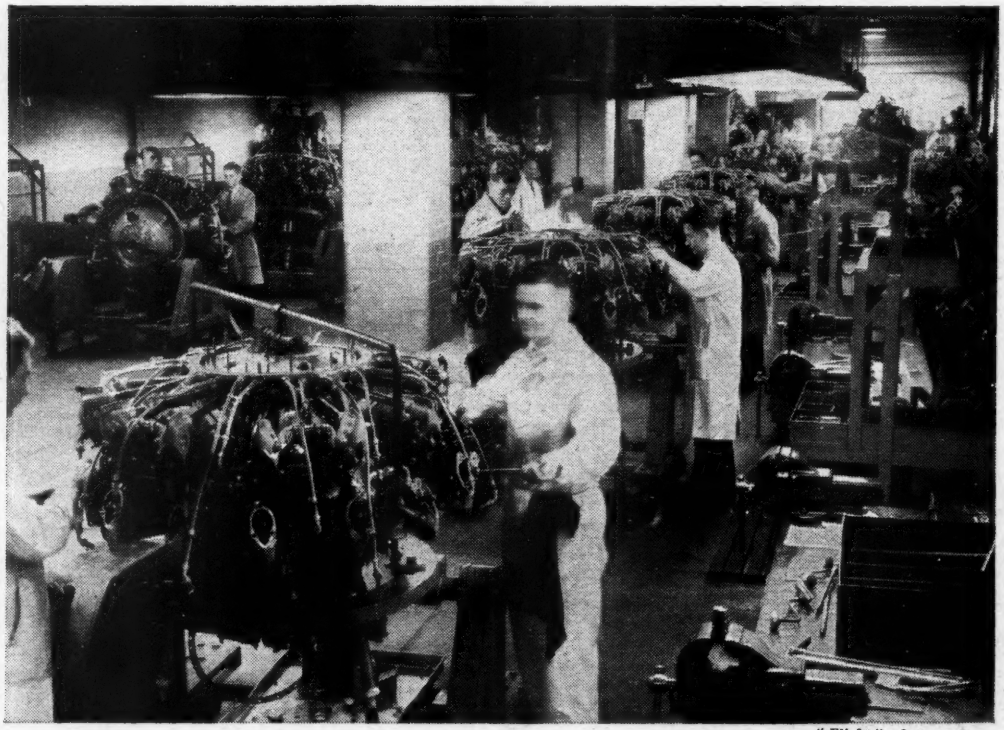
As a first step in considering a new type of aircraft, weight per passenger was the most significant single parameter in considering direct costs for a given stage distance. Cheap transport could only be obtained, he said, by a marked reduction in the all-up weight of aircraft per passenger. This was a more direct and simple method than increasing speed for improving economy, since it might not be possible to use the speed to the best advantage. It was clearly of importance that speed should be usable, that is, that the increased frequencies implicit in the use of higher operating speeds in a given route system at an economic utilization could be generated without any pronounced decrease in load factor. For this reason high speed became increasingly difficult to use as stage distances decreased.

Forecasting Traffic

While everything rested on obtaining the right aircraft for the task, and bearing in mind that it may take four to eight years to bring into operation a new design, the lecturer stated that it was necessary always to forecast traffic in the area as a whole and also over specific routes in regard to volume and frequency. It had been suggested that traffic between two towns varied directly as a product of the population and inversely as the distance. It had also been concluded that the law was best represented by the square root of the product of the population and inversely as the distance. Mr. Rowe presumed that both referred to maximum demand if traffic had been steadily developed There were then two aspects to the problem: the development of traffic, and catering for the full potential traffic.

Referring once again to the development of new aircraft, Mr. Rowe said that it was too expensive to develop aircraft and operate them at the same time. The operator was, however, an essential partner in the process, and it would probably be best done conjointly, although each might look for financial support from national resources. He thought that the Americans were moving towards the same idea. The period of development should cover, he said, a full year of flying and two major overhauls of airframe and engines, that is, upwards of a thousand hours. Such development would forestall any engineering troubles and provide the opportunity of establishing economic maintenance processes and promote good utilization. He noted that the Constellation took five years to develop before being used by civil operators.

Mr. Rowe considered that the number of types of aircraft should be reduced to the minimum consistent with service to the community. The Americans at one stage, he said, operated practically all traffic with the D.C.3. The principle of minimum number of types allowed a common basic design for passenger and cargo carrying, common navigational aids, and the use of the same power plants in different types. The whole problem of economic operation was, he said, inextricably linked with decisions of I.C.A.O. and I.A.T.A., and any questions raised were of wide national significance.



"Flight" photograph.

The final assembly lines at Treforest. Wasps are in the foreground and a parallel line of Hercules in the rear.

CYMRU YN DANGOS Y FFORDD

"Wales shows the Way"—With a Little Help from B.O.A.C.

THE title of this article is cribbed from incentive placards exhibited in the shops at B.O.A.C.'s repair base, Treforest, Glamorgan. Nine miles from Cardiff, up the Taff Valley, is the Treforest Trading Estate —a "junior Slough"—enclosed by the bold, upthrusting profiles of granite hills. Here, seemingly far removed from the world of airports and physical flight, are repaired the air-cooled radial engines and hydromatic airscrews used by the Corporation. Welsh men and women are contributing their part—and a very valuable part it is—to maintaining the efficiency of Britain's overseas air lines.

"Flight" photograph.

Metal-spraying cylinder barrels with atomised aluminium.

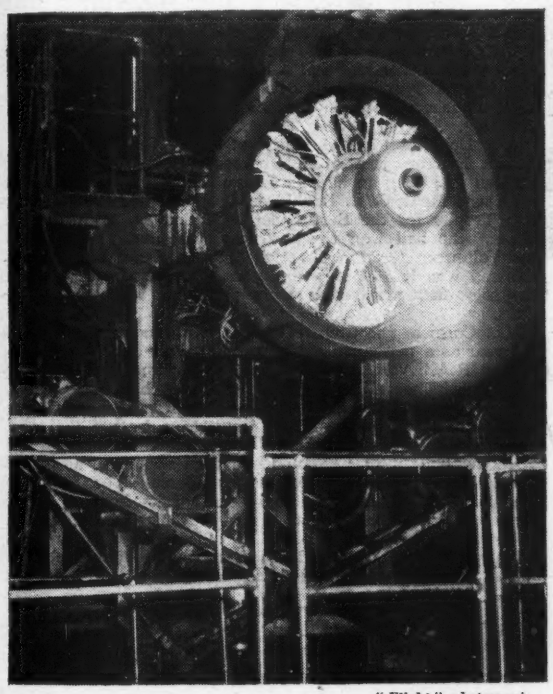
Operationally, B.O.A.C. is divided into three main divisions which are, respectively, (i) Atlantic, with responsibility for the services between Britain and America, and for which the headquarters are in New York, and the maintenance base at Dorval; (ii) Africa and Middle East, with responsibility for all services in that area, and (iii) Eastern, governing all operations in India and the Far East. As an adjunct to these three divisions, the repair division forms a fourth arm, the function of which is to execute major repair work for the other three. The repair division was actually formed in October, 1946, by combining the Corporation's Propeller and Engine Repair Auxiliary (P.E.R.A.), the Airframe and Component Overhaul Base at Croydon, and the Engineering Experimental Factory (then at Bristol, now at Brentford but in process of integration with Croydon).

The Treforest base was established by B.O.A.C. in May, 1940, and since that time has achieved the impressive total of 12,000 engines overhauled. It is at present turning out about 130 overhauled engines and approximately 70 airscrews per month. A cardinal feature of Treforest activity has been—and to a certain extent still is—the salvaging of unharmed parts from damaged engines, more than 3,700 such power units having been dismantled in the seven-and-a-half years of the repair base's history. Since the dissolution of P.E.R.A. at the end of September, 1946, Treforest has been operating as a purely commercial entity. All executively concerned with the base, particularly Mr. J. H. Robson, manager of the repair division, W/C. V. Rees, his assistant, Mr. C. E. McGibbon, administrative manager, and Mr. G. A. Hummerstone, works manager at Treforest, are very proud of the fact that, without financial aid by subsidy in any shape whatever, they have succeeded, as the books show for the first six months of independent work, in breaking a little bit better than economically even.

This is a state of affairs which reflects extremely creditably upon all concerned.

Engines and airscrews arrive at Treforest by road and by rail from the bases of the Corporation's operating divisions and, having been uncrated at the reception bay, are at once sent on their journey of dismemberment. In the case of engines, these are immediately stripped by specialist teams, being dissembled on a line system. In this connection it is worthy of record that throughout the base the policy has been to employ specialist labour; that is to say, a team of men has the job of, for example, removing and dissembling the supercharger, this being the only job they do; it will, however, be done at maximum speed and efficiency. As the line system is adopted at Treforest, the number of men to a section is governed by the man-hours required to do that particular job in order to keep the engine moving along the line at regular interval. Thus it is that the labour distribution is governed by movement/work requirements.

When the engine is completely dismantled, the whole of the components are very carefully packed into large



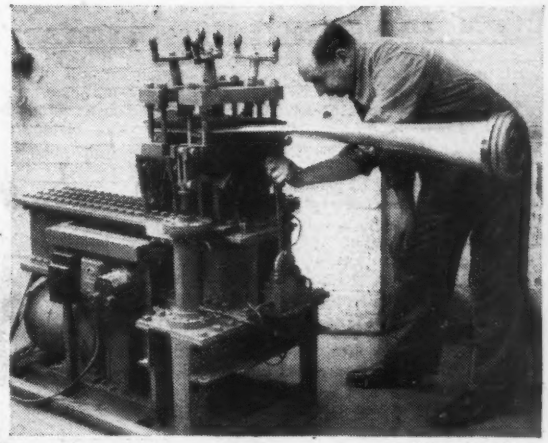
"Flight" photograph.

A P. and W. Wasp on test on one of the 12 beds at Caerphilly.

metal baskets for degreasing. From the degreaser the basket is soaked for three to four hours in one of a battery of Vista (creosol-base) tanks at 90 deg C. Each of the Vista tanks is flanked by a hot-water tank of similar dimensions, into which the baskets are dipped prior to moving on to the paraffin spray. The individual components are then separately air-dried, again degreased, and finally stacked on tray trolleys.

Adjacent to the degreasing section is a sub-section where cylinders are externally cleaned by sand blasting. Cylinder bores, pistons and various other light-alloy parts are blast-cleaned by pip-bombardment. We must confess to finding pip-blasting quite novel; the pips are, in fact, broken apricot stones which are quite sufficiently hard to clean a piston of carbon, yet are not hard enough to cause damage by impact on the metal.

In the same shop as the blasting booths are two metallization booths in which a fine wire of aluminium is automatically fed into a special nozzle incorporating a pressure flame rather like a blow torch; the aluminium wire is



"Flight" photograph.

An hydraulically operated blade-twisting machine in the airscrew repair section.

melted and the high-velocity jet sprays it in a finely atomized molten mist so that, in fact, the part being treated is "painted" with an aluminium skin.

After passage through the marking and magna-flux sections, all parts are taken into the first-stage viewing room. In this bay, which is staffed entirely by girls, a preliminary inspection is made and obviously hopeless parts are rejected. Parts which the girl viewers consider doubtful are later checked by experienced (male) inspectors, where they are alternatively passed as capable of renovation, sent back as suitable for salvage, or dismissed as beyond redemption. Those parts which require renovation are issued direct to the appropriate sections of the factory where, having been refurbished, they are all canalized into a department which is called Main Control.

Order of Renaissance

This is best described as a kind of stores and rallying point for all the bits and pieces which go to make up a complete air-cooled radial engine. Complementing Main Control are the main stores in which are stocked only bought-out parts, although the selection comprehensively covers everything from bar stock to magnetos. Items which are rejected during the passage through the factory to this point are replenished by brand-new items from these stores. Salvaged components which have been renovated to a pristine condition are stored in Main Control, however, and a new item will not, of course, be extracted from the bought-out stores if a salvaged replica already exists.

The assembly-point function of Main Control is to bring together every item required for a sub-assembly such as, for example, a reduction gear, and all the requisite components are then issued to the appropriate section on the assembly side of the works. The various sub-assembly sections run from Main Control at right angles and are, in turn, bounded at the opposite end by the main assembly line which, again at right angles, is thus parallel to the Main Control. The disposition of the sub-assembly sections is such that, starting from the beginning of the main assembly line and working past each sub-assembly section in turn, the engine is rebuilt, each sub-assembly being delivered at the position and time that it is required.

As in the dismantling side of the works, so in the assembly section does the specialist worker system apply, but to this basically sound production system B.O.A.C. have added the refinement of graduating a skilled man from section to section if he gives evidence of qualifying for such movement. By this means, boredom with a given job is avoided and a man who, as it were, completes the course, finishes up with an unrivalled knowledge of the engines. From this he can, if he wants, progress to higher things.

Of the renovation and salvage reclamation work, mention

Cymru Yn Dangos Y Ffordd . . . . .

must be made of the hard-chrome deposition section of the plating shop A crankshaft, for example, which has been ground, plated with hard-chrome and reground is as good as the brand-new component, for the plated bearing surface is as hard as the pristine metal. As an example of the economics of this process, a typical airscrew shaft has a prime cost of about £140; to grind, plate and regrind costs about £5 and, as stated, the refurbished shaft is equal to new. Other forms of plating catered for at Treforest are, respectively: copper, silver, cadmium and lead-flash, whilst chromating and Parkerizing are also executed.

Another valuable reclamation process is that for ball- and roller-bearings, the average figure for successful renovation being about 50 per cent This department was of extreme importance during the war, when the supply of ball- and roller-bearings for the maintenance of Pratt and Whitney R1830 engines was, at one period, available only from this source.

Every engine overhauled at this base is given a 5- to 7-hour clearance run on the test beds before re-issue; further, one engine in 25, chosen at random, is sent back for strip inspection. At the test establishment, high up the Nantgarw hillside, about two miles from the main works, the number of defects found during engine runs is satisfyingly small.

To turn to airscrews, these are dealt with in a small separate section of the factory. The flow of the units and sequence of events is, however, basically similar to that for engines, but, necessarily, the fewer component parts and comparable lack of complexity in an airscrew as compared with an engine means that the whole series of movements is rather shorter and more compressed. Hamilton Standard and de Havilland Hydromatic airscrews are the two types at present dealt with, mostly the former, but it is expected that Rotol units will shortly be included in the programme.

Treforest has its own transport service by which collection and delivery of engines or airscrews can be undertaken from and to anywhere in the country. Additionally, there is a flying maintenance squad which is available at any time to go anywhere in the country to effect emergency service to any Treforest-overhauled engine, no matter to whose aircraft it may be fitted.

PRESENTATION TO LESLIE IRVIN

THE library at Londonderry House was the scene of a pleasant party on Monday evening last, when a small gathering of his intimate friends presented a silver salver to Leslie Irvin, of parachute fame, on the occasion of his return to the United States for a while.

Capt. Lamplugh, who made the presentation, spoke of Leslie Irvin's popularity during the whole of the 21 years he had lived in this country, and voiced the thanks of everyone for the large number of Allied lives which Irvin's parachutes were the means of saving.

Replying to his hosts Leslie was obviously much moved and gave the number of lives saved as over 30,000.

R.Ae.S. RECEPTIONS

A NUMBER of members of the Society have expressed a wish for a social function this session, and the Council have considered the suggestion in the light of the austerity conditions now ruling. The Council have also had under consideration the need to find an opportunity for members to see the Society's collection of aeronautical prints and rare books, to which has been added recently, through the generosity of Sir Frederick Handley Page, the remarkable Hodgson-Cuthbert collection, which was first formed in 1820.

It has been decided, therefore, to hold receptions on January 17th and 24th at No. 4, Hamilton Place, by the President, Dr. H. Roxbee Cox and Mrs. Roxbee Cox, supported by the Council. At these receptions many of the most interesting examples from the Hodgson-Cuthbert collection will be on view, and tea will be provided. The receptions will begin at 3 p.m. and end at approximately 6.30 p.m Tickets for tea will be 4s each, and each member may bring not more than three guests.

NOTTINGHAM U.A.S. DINNER

THE second annual dinner of the Nottingham University Air Squadron was held on Tuesday, December 2nd. It was a great misfortune that a large area of the Midlands was fog-enshrouded and the Q.B.I. conditions prevented all the principal guests, with the exception of G/C. Donaldson, from attending.

G/C. Donaldson is Staff Officer of No. 12 Group whose H.Q. station, Newton, is also the University Squadron's base. In addition to giving an address before dinner on the subject of high-speed flight, G/C. Donaldson also presented the Jonathon Cash Trophy for the Best Cadet to Cadets R. Ware and H. Elliott, who had won the award jointly; and the Auxiliary and Volunteer Reserve Shooting Cup to Cadet B. Roberts, who had won it at Bisley this year. Twenty-six cadets who flew solo during the year were presented with special log books.

S/L. Cornish, the C.O., said that this was the Squadron's first year as a permanent flying-training unit under the reconstituted R.A.F.V.R. scheme. Nottingham and Loughborough Colleges, which combined in the Squadron, had been chosen, together with Birmingham and Southampton Universities, to give basic flying courses. An interesting feature was that there seemed to be an unusual demand for "A" licences and so, to this end, F/O. Chapman had been appointed an official testing officer for "A" licence candidates. The Squadron was, the C.O. thought, the only unit of its kind to be up to the official establishment of sixty. There are thirty-five cadets and twenty-five ex-R.A.F. officers on the strength, and a waiting list has had to be started. With five Tiger Moths, the Squadron's total flying hours for the year number 1,200.

BOOK REVIEW

Human Factors in Air Transport Design. By Ross A. McFarland, Ph.D. 670 pp. Published by McGraw-Hill Book Co., Inc., New York. 30s.

ON the happy-go-lucky philosophy that "where ignorance is bliss, 'tis folly to be wise," we are in two minds whether designers of global air transports ought to be encouraged to read this latest book from America on the correlation of the human and material factors involved in such design. A brief scanning of its contents clearly shows the increasing complexity of the designer's art. Added to the basic problems of aerodynamic, structural and mechanical design, he now has to become adept in ministering to the physiological and psychological needs of the fare-paying passenger who will eventually make or mar the reputation of his product.

This book covers a vast amount of useful ground on the comfort engineering aspects of transport design—all those subjects, that is, which concern the safety and comfort of air passengers and crews. The author's aims have been to: (1) present factual data to all aspects of design which influence those who operate aircraft or travel in them; (2) furnish the necessary interpretative background to show how physical factors create human ones; and (3) offer recommendations or possible solutions for the use of the designer. The result is a well-documented and absorbing study of recent advances in all those fields of human biology which have a bearing on air transport design.

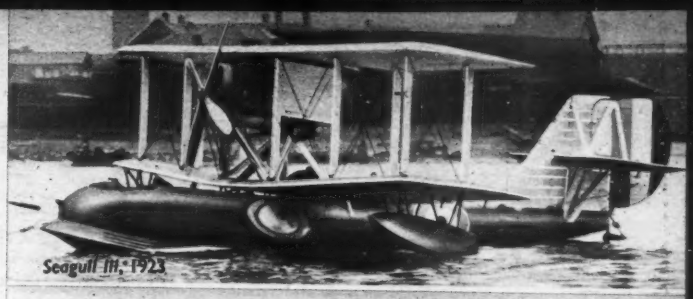
In harvesting this broad domain, the author winnows his way through such familiar topics as: cabin pressurization, ventilation, temperature, and humidity control; noise and vibration analysis; acceleration and motion effects; cockpit and control cabin layouts; passenger accommodations; and accident prevention. Less familiar subjects include the control of insects and airborne diseases, and the study of noxious gases. Many interesting facets are discussed, from soundproofed cabins to birdproof windshields, and all the hundred-and-one material factors in design which affect the morale, physical comfort, and efficiency of *homo sapiens* in flight. Each subject chapter is neatly rounded off with a summary and recommendations, while the book concludes with a statement of general policy designed to show how such objectives can be attained—the main objective, of course, being the safe and comfortable air transportation of passengers, whether just plain people or peregrinating politicians.

And so—on second thoughts—we agree with Dr. Edward Warner in his engaging foreword to the book when he states: "It is certain to have the close and immediate attention of professional men; but it ought also to be required reading for members of the aircraft and airline industries who have neither engineering degrees nor specialized knowledge of physiology, but who must realize the importance to aviation's continued progress of so building and operating an aircraft that it will meet the needs of its human occupants."

Both the author and the publishers are to be congratulated on a first-class job of work.—S. H. E.

ADVANCED AMPHIBIAN

Structural and Aerodynamic Features of the Most Recent Vickers-Supermarine Seagull



Seagull III, 1923

Seagull V (Walrus), 1933

Sea Otter, 1938

NEXT year will see the flight-testing of a number of new British aircraft of exceptional technical interest. Of these, the Vickers-Supermarine Seagull amphibian flying-boat will mark a major technical advance over current machines of its class, embodying, as it does, a variable-incidence wing in conjunction with a very efficient high-lift system.

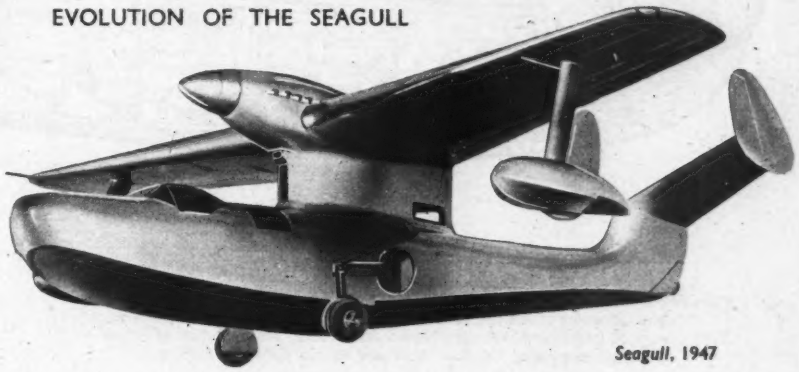
Aerodynamic and structural features of the design are the outcome of the most thorough research and testing. In the Supermarine Experimental Department at Hursley Park *Flight* was lately shown, for example, an elaborate test rig used for proving the variable-incidence gear and flap and slot mechanisms. Completion of the programme planned for this rig will mean that, before the first Seagull takes the air, key components will have been subjected to more reversals than would be demanded during the entire life of the aircraft. The efforts of Mr. J. Smith, the Supermarine Chief Designer, and his technical staff, should result in an aircraft having a speed range of 54-260 m.p.h., the merit of which performance will be especially apparent when it is considered that the Seagull is not only amphibious but is stressed and equipped for deck operation, and that the wings are designed to fold.

Two Seagull prototypes for the Royal Navy are well advanced at Hursley Park, and the first machine should be air-tested at Chilbolton within a few weeks. As a marine aircraft the type will be flown initially off Southampton Water, prior to delivery to Felixstowe and Boscombe Down for official trials.

The basic design of the Seagull—or S.14/44, to give it the Ministry of Supply designation—can be traced back to Specification S.12/40, issued early in the war. An aircraft was required which would be superior to the Walrus and Sea Otter not only in speed but in range, accommodation and general handling characteristics. Like the biplanes, it was to meet Naval requirements for carrier operation and carry armament and equipment proper to the spotter/reconnaissance role. Operational requirements having changed, the two Seagull prototypes are now being fitted out to perform air/sea rescue duties.

It is instructive to compare the Seagull of to-day with an amphibious biplane flying-boat bearing the same name, intended for similar duties, and built by the Supermarine Aviation Works, Ltd., about twenty-five years ago. The figures are eloquent in showing what has been achieved by refinement of aerodynamic and structural design, the adoption of a high-lift system in conjunction with a variable-incidence wing and the use of a modern power plant with contra-rotating v.p. airscrew.

EVOLUTION OF THE SEAGULL



Seagull, 1947

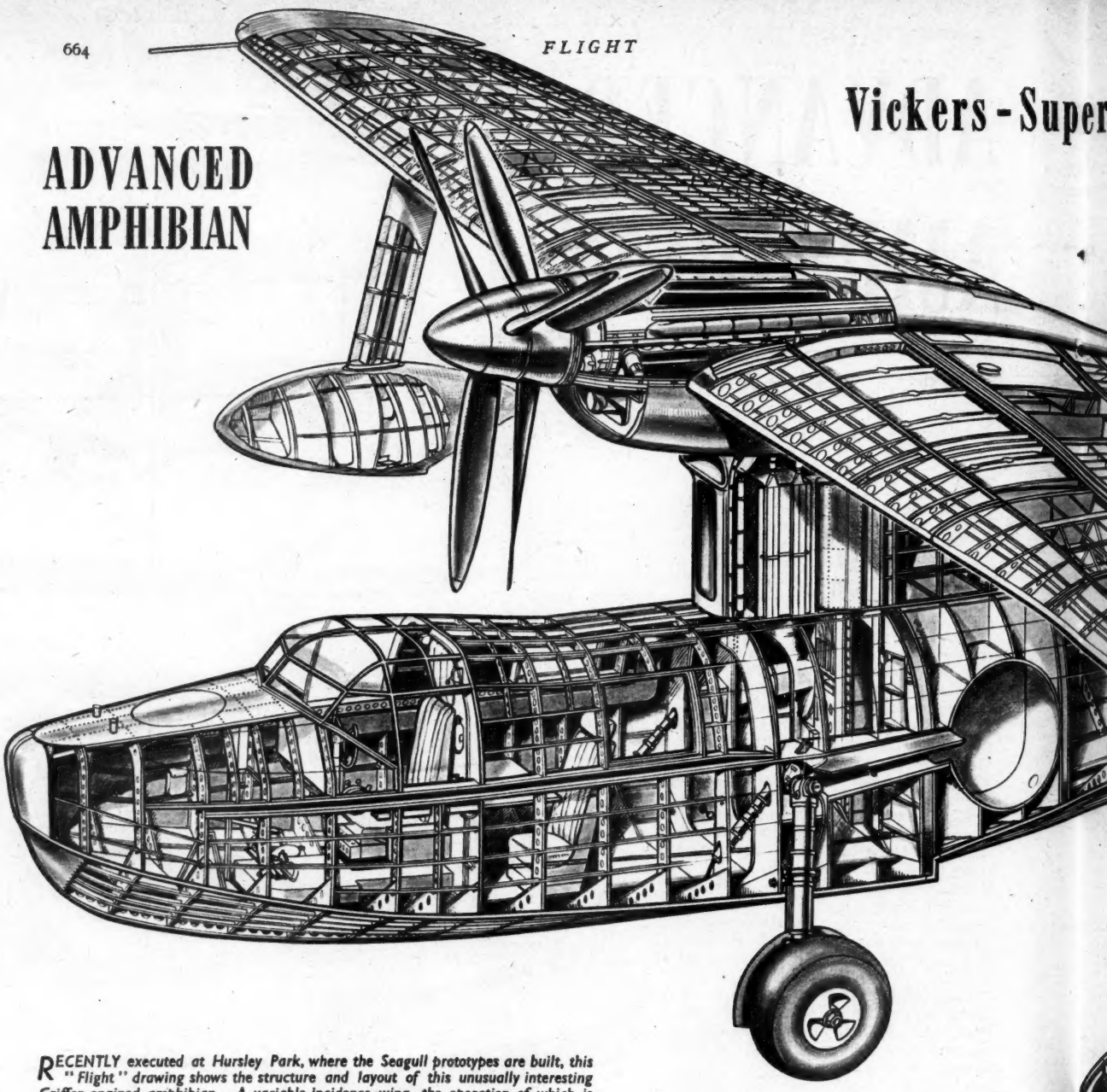
	Seagull, 1923	Seagull, 1947
Span	46ft 0in	50ft 6in
All-up weight	5,860 lb	14,500 lb
Wing loading	9.46 lb/sq ft	33.6 lb/sq ft
Engine power (take-off)	450 h.p.	2,500 h.p. (with methanol)
Max. speed	108 m.p.h. at S.L.	260 m.p.h. at 11,800ft
Landing speed	44 m.p.h.	54 m.p.h.

Briefly, the Seagull may be described as an all-metal high-wing monoplane deck-landing amphibian flying boat with variable-incidence wing, interconnected leading-edge slots and slotted flaps, and powered by a Rolls-Royce Griffon engine driving a Rotol contra-rotating tractor airscrew.

The flush-riveted Alclad-sheeted hull differs from that

ADVANCED AMPHIBIAN

Vickers-Super

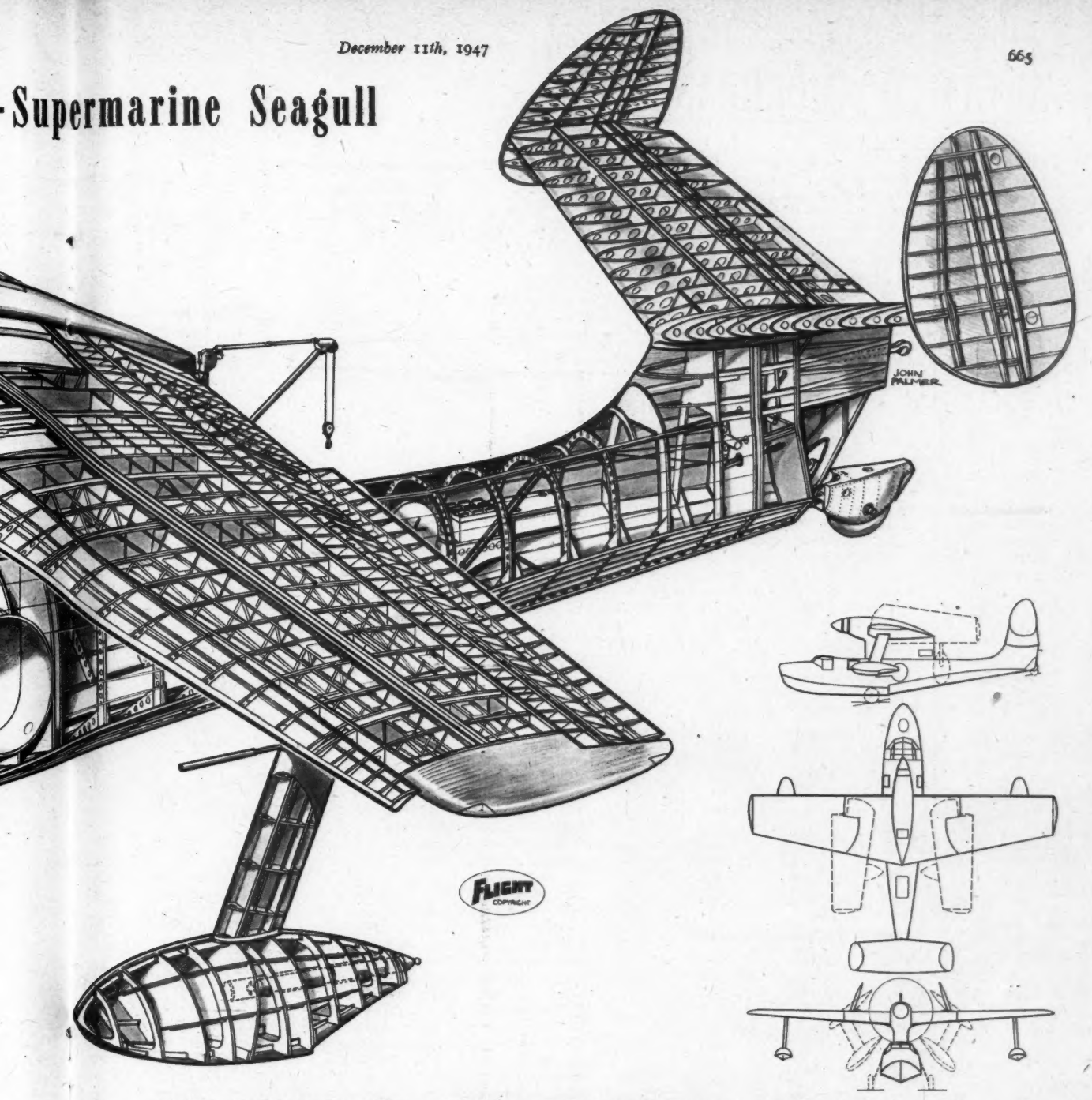


RECENTLY executed at Hursley Park, where the Seagull prototypes are built, this "Flight" drawing shows the structure and layout of this unusually interesting Griffon-engined amphibian. A variable-incidence wing, the operation of which is depicted elsewhere, full-span slots and slotted flaps are features.

of the Seagull's immediate predecessor, the Sea Otter, having a broader beam and a flared vee-section planing bottom, with a slight radius at the chines. (The Sea Otter's planing bottom, it may be remembered, is of "double-chine" design.) Above the chines the Seagull's hull is of inverted U-section. A single step is retained and the internal structure follows well-established Supermarine practice, with a strong keel member, thirty-one frames, intercostal stringers and two heavy longerons along the cockpit section between frames 2 and 11. The cockpit enclosure is of unusually clean design and embodies deep car-type side windows which are lowered or raised by winding a handle. Immediately ahead of the corner panels of the windscreen the shoulders of the hull are flattened to improve the field of view. Aft of the enclosure proper is a navigator's window, also serving as a knock-out emergency escape panel, and between the pilot's and navigator's positions, in the hull decking below the airscrew, is a sound-proof panel. Internal stowage of all marine equipment, and the use of retractable bollards, leaves the bow section very clean; no longer is this part festooned with wires.

The cockpit has provision for a second pilot, or pupil, and apart from the normal instruments and controls contains the switch for incidence adjustment. Aft of the navigator's position, in line with the wheel wells, it is possible to stand erect in the superstructure, or trunk, which connects the hull and wing. In this position is a hand wheel for emergency incidence control, and miscellaneous equipment, including electrical gear and fire extinguishers. The rear fairing of the trunk forms an observation post and within this it is again possible to stand upright. Radar and electrical apparatus and a Zwicky bilge pump are located near by, and in the after

-Supermarine Seagull



VICKERS - SUPERMARINE SEAGULL (S. 14/44) DATA

Rolls-Royce Griffon RG30SM Engine Driving Rotol Six-Blade Contra-Rotating Airscrew

DIMENSIONS

Span	50ft 6in
Length	44ft 1½in
Max. height, tail down (airscrew in Y pos'n)	15ft 10½in
Width, folded	23ft 6in
Wing area	432 sq ft

WEIGHTS

Bare weight (as amphibian) ...	10,510 lb
Fuel (285 gal)	2,052 lb
Oil (8 gal)	72 lb
Disposable load	1,866 lb
Normal all-up weight	14,500 lb

LOADINGS

Normal wing loading	33.6 lb/sq ft
Normal power loading	5.80 lb/sq ft

ESTIMATED PERFORMANCE (I.C.A.N. CONDITIONS)

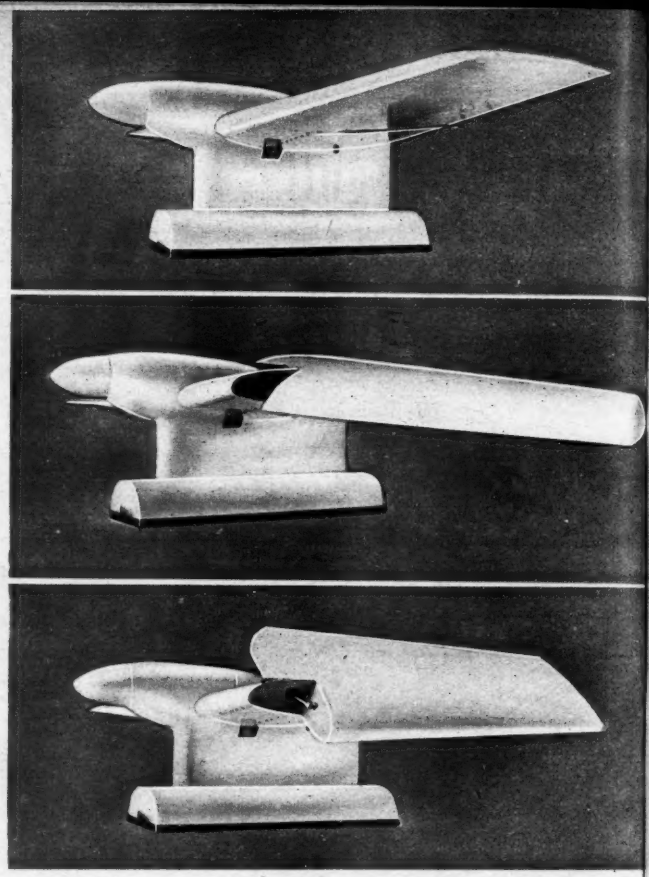
(at combat power and 95 per cent normal all-up weight)

Max. speed	260 m.p.h. at 11,800ft
Max. speed (M.S. gear)	247 m.p.h. at 3,800ft
Max. speed at S.L.	234 m.p.h.
Rate of climb at 14,000ft	1,140 ft/min
Rate of climb at 7,000ft	1,430 ft/min
Rate of climb at S.L.	1,430 ft/min
Service ceiling	23,700ft
Normal range at 131 m.p.h. at 2,000ft	875 miles
Max. range (with drop tanks) at 2,000ft at 133 m.p.h.	1,230 miles
Take-off time on water (still air)	16 sec
Take-off distance on land (still air)	765ft
Take-off distance on deck (31 m.p.h. wind)	317ft
Stalling speed (at 12,720 lb) engine off	59 m.p.h.
Stalling speed (at 12,720 lb) engine on...	54 m.p.h.

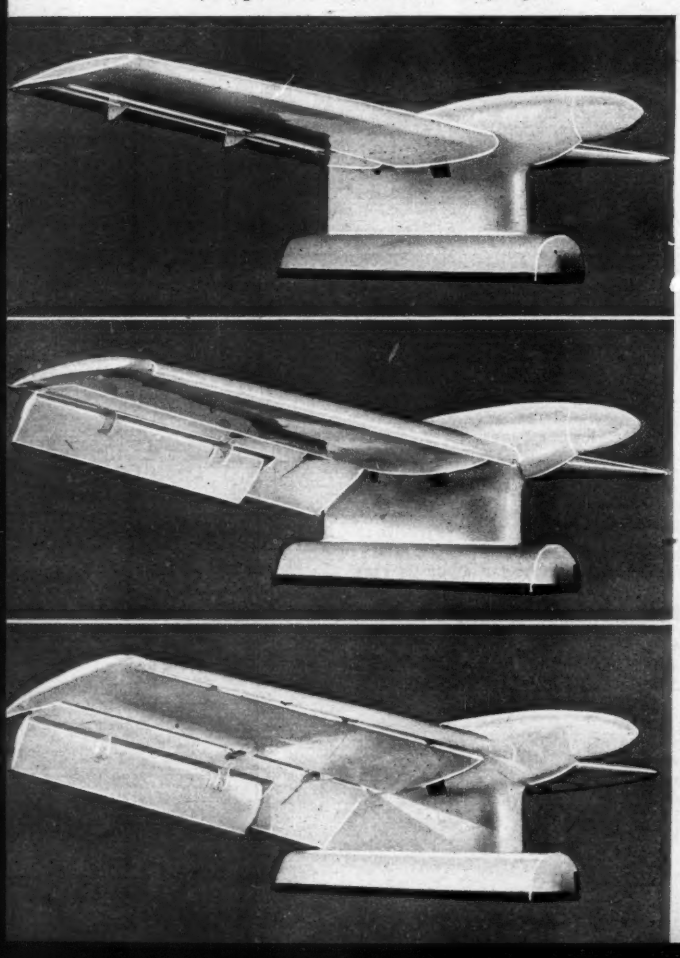
ADVANCED AMPHIBIAN...

part of the hull, where the cross-section is small, there is a radio altimeter. The internal arrangement can, of course, be varied according to the duty undertaken. In the air/sea rescue condition provision will be for casualties (these would be taken aboard through the rear hatch by means of a derrick attached to fittings at the rear of the trunk) and for a sick-berth attendant.

The undercarriage is attached to the hull at a special strong frame which also supports the engine nacelle by a pair of vertical struts housed in the radiator fairing. Due to the high-wing arrangement it was impossible to stow the retracted undercarriage in the wing, as on the biplane amphibians, and there are recesses in the hull sides to receive the main wheels and oleos. Hydraulic power is used to raise each main undercarriage assembly (comprising a Vickers oleo leg and Dunlop wheel) upwards and rearwards, the wheels being turned through about 180 deg during this operation. A hydraulic jack pulls a rack over a pinion which lifts the undercarriage and, as the oleo-wheel assemblies, when retracted, are over top dead-centre it is not considered necessary to lock them in place. In the raised position, the oleos are covered by fairing doors, pulled into place by the action of the legs on levers in the housing recesses. The wheels are partially covered when raised and, as they are lowered, a lock on the chine drops into position, a lug on the oleo hits a spring-loaded pin, and the gear is automatically secured in place. A vertical velocity figure of 13 ft/sec is claimed for the undercarriage. Should the Seagull be required solely for operation as a flying boat the main components of the chassis may be dispensed with, thereby increasing the disposable load by some 400 lb.



A fine electrically actuated model is used to demonstrate, below, the variable-incidence wing, and, above right, the method of wing folding. Maximum incidence is 12½ degrees.



The tail wheel and water rudder form a complete retractable assembly which preserves the profile of the stern, though the wheel itself is not retractable into the water rudder, thus increasing the effective area. For land operation the tail wheel has a castering action, and the pilot can engage it with the air rudder to give rudder bar control while on the water.

Before turning from the hull and its associated fittings mention must be made of the deck arrester-hook, stowed in the upswept stern section of the hull above the water rudder-tail assembly. This hook is ejected by a spring, the housing for which extends forward of the tailplane leading edge. Other hull fittings are for catapult gear, for assisted take-off rockets (attached to the hull by bayonet joints above the wheel wells) and for the telescopic locking struts housed in the wing floats which secure the mainplanes in the folded position.

Of streamline section, the trunk structure supporting the wing carries in its leading edge the ducted coolant and oil radiators, with their controllable shutters, and the engine air intake. The front and rear spar frames are continuous from the hull to the trunk and constitute the trunk main stiffening members; as already indicated, it is possible to stand not only between the "spars" of the trunk, but aft of the rear "spar."

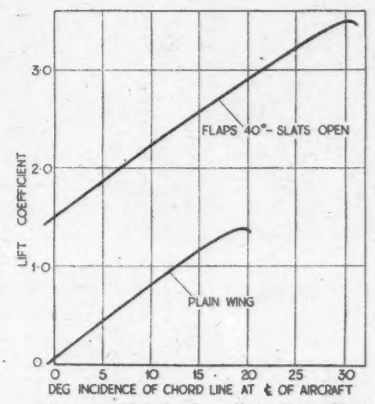
A characteristic feature of the Seagull is the 20-degree dihedral tailplane, with twin fins and rudders mounted at 90 degrees at the extremities. Conventional construction, with extruded spar booms and plate webs, is employed. A trim tab is inset in the elevator but, due to the use of a contra-rotating airscrew, the rudders have no auxiliary surfaces.

The cantilever wing has a N.A.C.A.23018 section at the centre line, changing to N.A.C.A.3410 at the tip, straight leading edges and swept-forward trailing edges, and comprises a centre section and two folding outer panels. In the centre section the main spar is raked and slightly swept forward and has flanged booms of trapezoidal section and an Alclad plate web. The rear spar likewise has a

Advanced Amphibian . . . . .

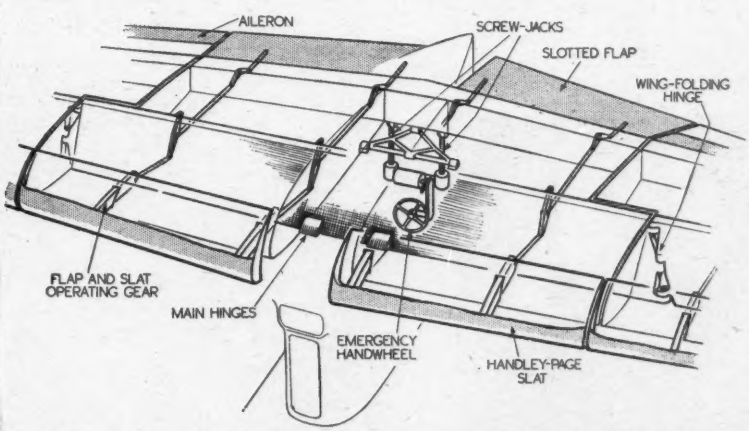
plate web, as have the front auxiliary and rear auxiliary spars; the latter extends only over the outer portions of the centre section. Structurally the outer wing panels are of more than usual interest in having no shear webs for the main spar. There are three latch pins, one each at the front auxiliary spar, rear auxiliary spar and rear spar respectively. The heavy ribs are of the plate web type and the lighter ribs are of girder construction throughout the outer wing panels and centre section.

Though divided at the centre section joints, the Handley-Page slats extend over the entire leading edge and are mechanically interconnected with slotted flaps fitted over the whole of the trailing edge, including those portions forward of the slotted ailerons. On these latter portions both flap and aileron droop together, in unison with the inboard flap section, the ailerons, of course, retaining their independent movement. To permit wing folding there is a hinged flap between the aileron and inboard flap. Housed in the wing are eight sets of flap and slot operating gear, with jacks, track bars and guide rods—four sets in the centre section and two in each outer mainplane. The centre section flaps slide rearwards on track bars and are drooped by a connecting rod moving through a shorter distance than the track bar. The flaps on the outboard wing panels are carried on faired hinges below the under surface of the wing.



Lift curves for the Seagull (engine off).

Partly to facilitate replacement, but also to minimize interference with the search radar, the wing tips are of wood. The aileron spar booms are half-circle drawn sections and the ribs are carried under the top boom and over the lower boom. Spar webs are inserted only to take local loads at the hinges. Similar construction is used in the outer flaps. Strong points for bomb carriers are located on the main spar, and when the aircraft is used for A.S.R. work these will each carry a 60-gallon jettisonable tank, or a rescue assembly.



A schematic representation of the variable-incidence system used on the new Supermarine amphibian. Flap and slot interconnection is also indicated.

Conventional construction is used for the lateral stabilizing floats. The keel is stiffened by angle members and there are six frames, five bulkheads and top, side and bottom stringers. Attachment to the main spar is by a raked cantilever strut. Each float houses a telescopic strut for bracing the folded wing to the hull.

Much of the centre section is occupied by six tanks for the internal fuel load of 285 gallons. There are two main metal tanks, between the main and rear spars, and four flexible tanks forward of the main spar. Fuel is automatically transferred by air pressure, taken from the exit side of a Pesco pump, from the forward outer tanks to the forward inner tanks, and thence to the rear main tanks. A similar delivery system is used in conjunction with the jettisonable tanks.

Although the variable incidence gear, the principle of which has already been tried on the Supermarine Type 322, or "Dumbo," has been discussed in general terms (see *Flight*, April 25th, 1946), special attention must be paid to this feature as applied to the Seagull, and some explanation given of its purpose. By varying the incidence of the wing it is possible to maintain the hull at its best angle for take-off, the wing angle being changed, if required, to suit conditions during the actual take-off run. Moreover, by setting the wing at high incidence the leading-edge slots are rendered fully effective. Another important consideration is that, with the wing at a high angle of attack, the pilot is enabled to approach the deck of a carrier with the hull of his aircraft in a less nose-up attitude, and accordingly to improve his view for landing.

Varying Incidence

In essentials the variable-incidence gear is extremely simple. The wing pivots on spherical phosphor bronze bearings on the front spar and the change in incidence is effected, either by electrical power or by manual means, through screw jacks connecting the rear spar to the trunk superstructure. The wing is normally at 2½ degrees to the hull datum, and the maximum incidence is 12½ degrees.

The A.C. electrical system for operating the high-lift devices is novel. There is a B.T.-H. engine-driven alternator (8.5 K.V.A. at 200 volts, 400 cycles, 3 phase) and the incidence change is effected by B.T.-H. actuators. An emergency system is incorporated for lowering the flaps, using power supplied from the accumulator through a B.T.-H. DC/AC converter.

The two prototypes are each powered by a Rolls-Royce Griffon 29, but any subsequent aircraft would have the RG 30 SM. The Griffon 29 is basically a Griffon VIII and delivers a take-off power of 1,815 h.p. A 0.59:1 reduction gear ratio and a two-speed blower with solenoid operation are features of this engine. The RG 30 SM is basically the Griffon 57 and is notable for its take-off power, using water-methanol injection, of 2,500 h.p. The water-methanol is injected into the supercharger eye by an automatically operated metering unit. Another point of interest is that high supercharger gear is used for take-off to achieve the maximum boost of 25 lb/sq in. The engine is carried forward of the leading edge on built-up bearers braced by two vertical tubular struts. A contra-rotating six-blade Rotol airscrew is fitted, irrespective of engine mark, and, as on the Supermarine Seafire fighters in service with Naval Aviation, should prove invaluable by eliminating the effects of engine torque.

Ratings of the Griffon RG30SM engine are: take-off (low gear) 2,500 h.p. at +25 lb boost; combat, 2,055 h.p. at 2,250ft at +18 lb boost, international 1,680 h.p. at 6,500ft at +12 lb boost. Max r.p.m. are 2,750.

G.A.P.A.N. AND B.A.L.P.A.

After the G.A.P.A.N. installation ceremony at Londonderry House. Left to right are Mr. G. Lindgren, W/C. Pike, G/C. Woodhead (deputy master), W/C. Gilfillan, Lord Nathan, F/L. Leatherdale, Capt. Lamplugh, and G/C. Cumming.

"Flight" photograph.

Pilot Associations Entertain

LONDONDERRY HOUSE was the scene, on December 4th, of the ceremonial installation of the Master, Deputy-Master, Officers and Members of the Court of the Guild of Air Pilots and Air Navigators of the British Empire. The Master, Lord Londonderry, is seriously ill and was not able to be present. The Chaplain-in-Chief of the R.A.F., the Rev. J. A. Jagoe, who is Hon. Chaplain to the Guild, said the prayers, and the Clerk of the Court, Mr. L. A. Wingfield, addressed the Guild. He pointed out that the aims of the Guild were to foster the interests of commercial aviation and for those who hold offices in the Guild to give unselfish devotion to its conduct. He announced that Lord Londonderry had been re-elected to the post of Master of the Guild, and G/C. N. H. Woodhead had been re-elected Deputy-Master.

G/C. Woodhead hinted that next year it was hoped that the Grand Master of the Guild, H.R.H. Princess Elizabeth, Duchess of Edinburgh, would honour the Guild with her presence. He proposed to send a message of good wishes for speedy and complete recovery to Lord Londonderry. The results of the ballot held on April 10th, 1947 were: Wardens of the Court, Paul Ward Spencer Bulman, William Neville Cumming, Alfred Gilmer Lamplugh and Clement Allin Pike. Members of the Court: L. R. E. Castlemain, F. C. Chichester, K. A. B. Gilfillan, A. V. Harvey, M. W. Hartford, H. F. Jenkins, F. R. Leatherdale, D. H. MacBeath, D. F. McIntyre, Miss R. M. H. Russell, A. Gordon Store, W. H. Sutcliffe, J. K. Quill, T. S. Wade and C. H. Willis

The Wardens and Members were then sworn in, and the installation concluded with a prayer, read by the Chaplain.

After the installation ceremony, hosts and guests, the latter including many prominent people, spent a cheery hour or two over refreshments. The spirit of good fellowship was not damped in the least by the failure of a mains fuse, which left the company almost in darkness.

"Flight" photograph.

More personalities at G.A.P.A.N. installation. Left to right: Miss Russell, G/C. Bulman, Marshal of the R.A.F., Sir John Salmond, the Rev. J. A. Jagoe, Chaplain-in-Chief, R.A.F., and Mr. Wingfield.

British Airline Pilots "At Home"

ON December 3rd, at the Savoy Hotel, the British Airline Pilots' Association met over drinks, and entertained their many friends. On occasions such as these the men who are the revenue earners for the air operators are able to meet, off duty, their own executives and those from other companies. Representatives of every sphere of aviation were present, and the room was filled with small groups intently discussing the many aspects of the industry. Mr. W. R. D. Perkins, Vice-President, and Captain J. W. G. James, Chairman of the Association, received the guests, who included Lord Nathan and Mr. G. Lindgren, Sir Harold Hartley and Mr. Whitney Straight, Mr. d'Erlanger and Mr. J. V. Wood. There were also two airline pilots representing K.L.M., two from the Union of Czech Flyers, Captain Stone from the Canadian Pilots' Airline Association, and Captain Fretz, representing Aeropers, the Swiss Flying-Staff Society. It would be quite impossible to mention all the others present, but it was a truly representative gathering.

In conversations with the members it was possible to detect a feeling of uncertainty about the future. The pilots are worried about the effect that the ban upon travel has had upon air traffic, and although it is temporary some feel that security has vanished. There were also some definite opinions expressed on the proposed revised licence regulations, and upon the medical standards and new methods of examination. The licence situation is regarded with some apprehension, especially by the older pilots. It is hoped that ample time will be afforded by the Ministry to allow effective study before the regulations become effective.

CIVIL AVIATION NEWS

JUST AIRBORNE : A Liberator taking-off from Prestwick, a familiar sight during the last five years. This Scottish Airport is one of the most important in the U.K. as may be judged by the decision that at Prestwick and London Airports only is constructional development to continue. During last October 2,831 passengers passed through the airport on 493 scheduled services, of which only 143 were British. In September, Prestwick was the seventh busiest airport in the U.K., handling 5,745 passengers.

B.O.A.C. Transatlantic Service Plans : DC-6 Crash Enquiry Findings : Controversy over Airport for North-East

SOLENT PROVING FLIGHT

SHORT SOLENT G-AHIT, the B.O.A.C. flying-boat *Severn*, left Poole at 0913 hrs G.M.T., on December 2nd on the first proving flight to South Africa. The new route is through Augusta, Cairo, Khartoum, Port Bell (Lake Victoria), Victoria Falls and Johannesburg (Vaaldam). The aircraft proceeded on schedule until during the last stage when trouble was experienced in one engine, and *Severn* returned to Port Bell. On landing, minor damage was caused to a wing-tip and wing-tip float. A Sunderland left immediately with spares. At least one more proving flight will be made before the route is opened for public passenger services early next year to implement the B.O.A.C. contribution to the Springbok service.

Owing to the recent economy in railway services the Southern Railway have found it impossible to continue the arrangement with B.O.A.C. whereby a coach was reserved on the train to carry passengers from London to the B.O.A.C. flying-boat departure base at Poole. B.O.A.C. have in consequence fitted four special Leyland Tiger coaches with aircraft-type chairs for this journey. Stops will be made in both directions at Basingstoke for a meal, and while the winter schedules are in force passengers will leave London on the day of departure from Poole, except for the Hongkong service when they will travel the previous day and stay overnight at Bournemouth.

B.O.A.C. ATLANTIC BASE

TRANSFER of the B.O.A.C. Atlantic Division Base from Dorval, Montreal, to Filton, Bristol, has been confirmed, and the Corporation's long-term plans have been made known. In order to maintain continuity and the high frequency of transatlantic services, the Corporation will continue to use Dorval until the Stratocruisers are delivered, probably in the second half of next year. The move will obviously be made in stages, but by the time the Stratocruisers are ready for service preparations should be sufficiently advanced to permit the remainder of the Division to leave Montreal, including the Constellation maintenance organization. Stratocruisers and Constellations will then operate together on Atlantic services and so increase the frequency. The transfer of the base will, it is hoped, be completed by the end of 1948. It is probable that the Corporation will use one of the wings of the enormous assembly hangar specially constructed for the Brabazon I, thus saving construction costs, and by the time the wing is required for the advanced stages of Brabazon I construction and maintenance it may be assumed that Heathrow will be in a position to accept the Corporation's maintenance organization.

As has been previously mentioned, the Constellations have been averaging more than 8 hours payload use per day per aircraft during the past three months, and eight round trips a week have been operated with five aircraft. During the period from August 31st, 1946, until the end of October, 1947, the total number of transatlantic crossings for these aircraft was 700. The Corporation also claim that a greater number of passengers per aircraft have been carried than by other airlines on this same route, and during October the average number per eastbound service was 41 against the nearest competitor's figure of 38; in the westbound direction the average was 15 against 13.

CIVIL AIR COUNCIL

LORD NATHAN, the Minister of Civil Aviation, has formed a Council of Advisers. The Council will meet regularly with Lord Nathan as the chairman and Mr. Lindgren, the Parliamentary Secretary, as vice-chairman. The members of the Council include Air Chief Marshal Sir Frederick Bowhill, Chief Aeronautical Adviser, Air Marshal Sir Conrad Collier, Controller of Technical and Operational Services, Professor George Temple, Chief Scientific Adviser, Mr. Leslie Gamage, Chief Business Adviser, Lord Dukeston, Chief Industrial Adviser, and Major-General W. F. Hasted, Controller of Aerodromes. The last-named has just been appointed to take charge of the Aerodromes Department in the Ministry, and his duties will include the development and administration of State-owned airfields in the United Kingdom and to act in an advisory capacity on airfields throughout the Colonial territories in the Empire.

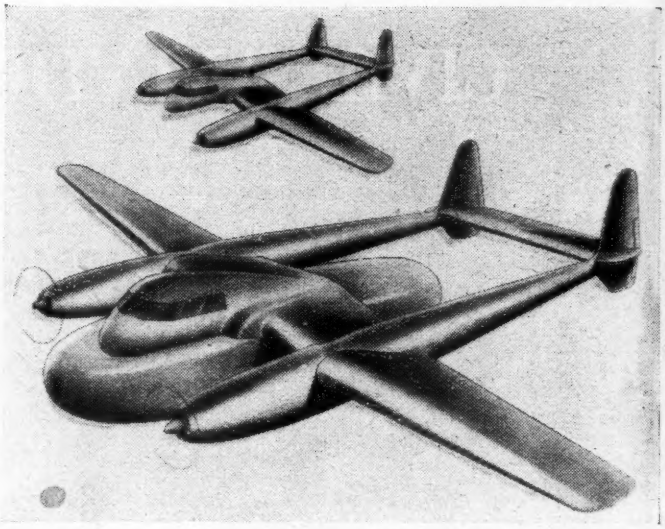
PETROL CAUSED DC-6 FIRES

IN a statement by Mr. T. P. Wright, U.S. Civil Aeronautics Administrator, it is stated that the fires which recently caused all DC-6 aircraft to be grounded were shown to be due

Civil Aviation News . . . . .

to an overflow of petrol running into the cabin heating system. The accidents which were the subject of an enquiry were the Bryce Canyon accident, when a DC-6 crashed in flames, and the landing of another DC-6 with a serious fire on board at Gallup, New Mexico.

"The Committee has already determined to its satisfaction that an overflow of gasoline when being pumped between the main tanks and the auxiliary tanks caused the fire at Gallup, and that the same conditions probably caused the fire in the other accident," said Mr. Wright. "This gasoline was first forced back along the skin of the aircraft, and was then sucked into the cabin heating system." (The DC-6 has a cumbustion heater system.) Changes to prevent recurrence of this particular hazard are being recommended by the Enquiry Committee, to be considered by the Civil Aeronautics Administration, and it is reported that other changes may be required before DC-6s are returned to service. In *Flight*, November 27th, it was reported that at an earlier stage of the enquiry it had been found that leaks in the hydraulic system had affected the glass fibre insulation, which had been proved to have a wick action, and that the makers had recommended removal of the greater part of this type of insulation. The enquiry had at the date of Mr. Wright's statement nearly completed its investigations, and American airline representatives have been saying that they expect to be operating DC-6s again in January, 1948. The withdrawal of these aircraft from service has caused considerable upsetting of airline schedules, and financial loss.



AMERICAN M-68. An artist's impression of the Fairchild design for a detachable-fuselage aircraft, with interchangeable freight "pods." The design is somewhat reminiscent of the Miles M-68, shown for the first time at Radlett.

CIVILIAN STIRLINGS

IN the September 4th issue of *Flight* mention was made of the activities of Belgian Air Transport S.A. operating from Melsbroek, and with headquarters at 228 Rue de la Roi, Brussels. The company have since bought ten Stirlings from war surplus stocks in the U.K. and which are being overhauled by Airtech. A Belgian company are then to convert five for passenger carrying operations and five for cargo carrying. The first charter flight started last Monday with the departure from this country of a Stirling, flown by W/C. T. R. Morrison, the company's chief pilot, carrying 32 passengers to Peking.

ATLANTIC COMMUNICATIONS

PLANS drafted by a technical working committee of the International Air Transport Association include a strong recommendation to I.C.A.O. to expedite the building of Consol radar beacons in Norway, Northern Ireland, Iceland, the Azores, Newfoundland and Bermuda, a step already agreed by governments taking part in the Dublin meeting. The I.A.T.A. committee puts forward as a strong argument the fact that the North-Eastern chain of Loran beacons may have to be closed down in 1949, when channels may no longer be available for them.

Reference was made last week to the forming of an inter-aircraft chain of VHF communication over the North Atlantic when normal HF transmission is interrupted by disturbances. The scheme starts for an experimental six months on December 15. It is considered that there are always sufficient aircraft of airlines which are members of I.A.T.A. in the air to make possible a continuous network of relay signals, with crews transmitting regular hourly weather and position reports and other operational messages to other aircraft until relayed to within range of a ground station. When there is a gap in inter-aircraft communication, a weather ship will be asked to act as a relay station.

Endorsing the present I.C.A.O. provisions for serving the three main air routes across the Atlantic, the I.A.T.A. committee suggests the following alterations to arrangements drafted at the April, 1946, I.C.A.O. conference at Dublin:—

> The rearrangement of frequencies so that ground stations need not handle more than eight communications channels at one time. The transfer of weather reports to other than route frequencies in order to reduce the load on present circuits. In making broadcasts of weather reports, major terminals are to include reports of alternate airports as well, in order to keep to a minimum the number of stations on the air at any one time.

To relieve an overload on channels now used on the "middle route" from N. America to Europe via Shannon, the I.A.T.A. airlines have informally agreed among themselves to a distribution of the groups of frequencies each will use for normal operational messages.

CUTS IN B.E.A. STAFF

ALTHOUGH the cuts in B.E.A. staff and services, necessitated by the travel ban, are still proceeding on a drastic scale, they may not be quite so severe as had been expected earlier. Nevertheless, it is estimated that 1,500 will be leaving the Corporation's service. During September and October, 1946, 11,501 and 11,309 passengers respectively were flown; during the same months this year, 18,292 (September) and 13,876 (October) were carried. Thus in October this year, in spite of the travel ban commencing on October 1st, 2,567 more people were flown than in the same month last year. In some quarters it is believed that the ban on tourists has stimulated air travel by businessmen, who may be certain of a seat, with reasonable notice, on any route except that between London and Paris. The October figures, though better than those of last year, are about 25 per cent below the September, 1947, ones.

TRANS-AUSTRALIA AIRLINES

FOR the twelve months ending June 30th, 1947, Trans-Australia Airlines showed a loss of £505,000. The annual report issued by the Australian National Airlines Commission, which operates the airline, states that this figure reflects establishment costs rather than operating losses, and adds that economies in the current year would be affected by the interchange of facilities with Qantas and with British Commonwealth Pacific Airlines, Ltd., which was formed by the Governments of the U.K., Australia and New Zealand. It further states that from the beginning of T.A.A.'s trial operations in September, 1946, until June, 1947, revenue was £1,038,000; expenditure had been £1,339,000 for training and route operations, and £204,000 for general administrative purposes. Treasury advances to offset initial establishment costs amounted to £2,170,000 in June, at which time employees totalled 2,392. All operations were free of serious accidents: 147,000 passengers, 2,500,000 lb of freight and 869,000 lb of mail were carried and 4,000,000 miles were flown. Mileage flown is at present at a rate representing 7,500,000 miles a year.

CROFT AIRFIELD SCHEME ABANDONED

WITH the curtailment of B.E.A.'s activities, it is unlikely that a Continental service from north-east England will be operated, according to the Ministry of Civil Aviation, and Croft airfield is not now to be developed. It is being offered to other Ministries for flying or non-flying purposes, and though it is understood that every effort is to be made to see that activities of the Darlington Flying Club based at Croft are not prejudiced, it will obviously be at the mercy of the Government department which takes it over. There has been indecision over the use of Croft as the north-east's main terminal for 18 months or so and it has been considered as

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a stopgap only, while the West Boldon scheme was under discussion. The future of the scheme for a major airport at Boldon, with three runways and costing £2,000,000, is still unknown. The existing airfield at Woolsington, Newcastle, is not suitable for aircraft larger than feeder types such as the Rapides, which have already been used on the short-lived Newcastle-Carlisle-Belfast service.

The Ministry's statement that "it is now unlikely that a direct service to the Continent from the north-east will be introduced during the period in which Croft might have been used" is regarded locally as a great blow to all hopes of air travel developments

At a meeting on December 3rd Newcastle City Council deferred for a month a decision on the proposal to extend runways and increase facilities at Woolsington in order that it might be used by Dakotas and Constellations. Councillor Frank Russell, who is chairman of the Airport Committee, said that Aer Lingus were interested in the possibilities of operating Constellations between Ireland and Newcastle. It was pointed out that if no grant was received from the Government the cost, which has been estimated at £450,000, would have to be met entirely by the city and might mean a 4d rate increase over a long period. The proposal to consider the scheme for another month was adopted, and it was decided that the Council would ascertain if any Government grant could be obtained on the grounds that the airport would serve not only Newcastle but the whole of the North-East.

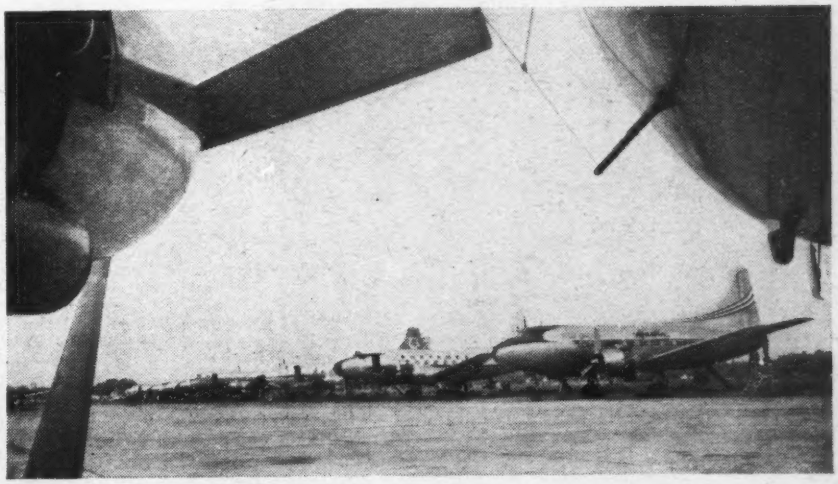
FREIGHT ONLY ON LONDON-AUSTRALIA LANCASTRIANS

NOW that Qantas is using Constellations on the Sydney-London route operated jointly with B.O.A.C., the Lancastrians of B.O.A.C. are carrying mail and freight only. At present there are one Constellation and two Lancastrian services a week in each direction, but on January 1st Qantas plan to increase Constellation services to three a fortnight, on which date the Lancastrian B.O.A.C. service will be reduced to a similar frequency. Though the route taken is different, both types of aircraft are scheduled to complete the journey in just under 4½ days, with five stops for the Constellations (Cairo, Karachi, Calcutta, Singapore and Darwin) and six for the Lancastrians (Castel-Benito, Lydda, Karachi, Calcutta, Singapore and Darwin). There are in addition three services a week with Hythe flying boats, which carry both passengers and freight.

The Constellation service's first flight departed from Sydney on December 1st and from London on December 6th, and this constitutes the first through service to London from Sydney flown by an Australian operator. Previously, Qantas operated the Sydney-Singapore section of the route (flying boat) and the Sydney-Karachi (Lancastrian) section of the U.K.-Australia services. The first scheduled flight previously mentioned was made in the Gold Plate Constellation *Charles Kingsford-Smith* and was flown by Captain MacMaster. The company, which is now Government-owned, entertained personalities in British civil aviation on December 5th and demonstrated the aircraft next day at London Airport.

PAKISTAN AIRLINE

MR. YUSSUF HARROON, chairman of Pak Air Services, formed with headquarters at Karachi to operate services between Pakistan and the Middle East, has been visiting London to arrange for the purchase of aircraft and to engage air crews. It is understood that seven Dakotas have been purchased from U.N.R.R.A., that two C-46s have been acquired, and that a deal has been negotiated with American interests for the purchase of two Liberators, already converted for passenger carrying. At the moment the company's application for licences from the Pakistan Government is still being considered, but the purchase of aircraft is being carried out simultaneously with the licence application. Besides a number of internal services in Pakistan, it is planned to operate to Lydda, Iraq and probably Cairo. The headquarters of the company is at Harroon Chambers, Napier Road, Karachi.



ON THE LINE. Martin 2-O-2 aircraft for North-West Airlines, Line Aerea Nacional (Chile) and Linea Aeropostal Venezolana on the Glen Martin company's line.

PASSENGER REQUIREMENTS

SINCE May of this year, British European Airways have been using a card for passengers' comments on both the internal and Continental services, but a more elaborate version is now to be introduced and used for one week of each month on all routes. Some interesting facts emerged through the use of the old cards. Passengers, it was found, greatly appreciated visits from the pilot to discuss the route, as well as progress bulletins, but suggested that route maps should also be provided. Footrests were requested by some, also clocks and altimeters. Complaints were made that proper explanation was not given about the correct time to arrive at terminals for the completion of formalities before the coach left, which the Corporation dealt with by the issue of a leaflet with each ticket.

BREVITIES

Columbia and Great Britain recently signed a civil aviation agreement which was issued as a White Paper on December 4th. The agreement provides for reciprocal facilities for air services between the two countries.

* * *

Mr. Quentin Roosevelt has been appointed vice-president and director of the China National Aviation Corporation, by Pan-American Airways. The appointment is effective from April 1st.

* * *

Dr. Ivan Pietor, Czechoslovak Minister of Transport, left Prague on December 4th for Cairo on a tour during which he will contact the Government of Egypt, Palestine, the Lebanon and Turkey to arrange air pacts.

* * *

Air France is once more serving free luncheon baskets, and since November 24th this amenity has been offered on all routes. The composition of the meals is the same as those formerly costing 10s a head and includes a quarter or third of a bottle of wine—British European Airways Corporation charge for all meals and drinks.

* * *

The American C.A.B. has rejected the joint application of the Waterman Steamship Corporation and Waterman Airlines, Inc., for an air service between New Orleans and San Juan, Puerto Rico. The grounds of refusal were low traffic potential, and although the applicants did not seek a Government contract to carry mail, the C.A.B. said that the proposed service would lessen the revenue of existing operators and cause them to require a heavier "mail compensation." The C.A.B. ruled that there must be a public need for such a service. The case is of particular interest as demonstrating the powers of the C.A.B.

* * *

Direct flights between Hawaii and 74 cities on the United Air Lines system have been resumed with the commencement of

Civil Aviation News . . . . .

a daily round trip between Honolulu and San Francisco. Flights had been cancelled since November 11th, when U.A.L. withdrew their DC-6s from service. Schedules are now being operated with DC-4s hired from the Matson Navigation Company until the DC-6s return to service.

* * *

A twice-weekly passenger and freight service between Budapest and Belgrade has been inaugurated by Yugoslavia.

* * *

Aer Lingus has now started its Dublin-Rome service. One round trip weekly, using 44-seater Constellations, is at present operated and there is a departure from Dublin every Wednesday, returning every Thursday.

* * *

In Notice to Airmen No. 348, 1947, the M.C.A. announces the dates and places of examinations for Civil Aircraft Navigators' Licences for the first quarter of 1948.

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Under an agreement between the Turkish Airways administration and an American airfield construction company, seven new airports are to be built in Turkey at a cost of £3,750,000.

* * *

Air France services will not be operated on December 25th and January 1st, with the exception of those to Teheran and Ankara.

* * *

South African Airways put the first six of their fleet of eight Vikings into service last month and are operating three return services a week, between Johannesburg and Cape Town, via Bloemfontein, entailing a monthly mileage of 65,000.

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Eight return trips weekly are to be made on the increased Tasman service between Sydney and Auckland on every day except Sundays. There will be additional trips from Auckland on Tuesdays and Fridays and additional ones from Sydney on Wednesdays and Saturdays.

* * *

A study of those particular trends in aircraft design which may be expected to call for stronger and bigger runways is to be conducted by the Air Navigation Committee in conjunction with I.A.T.A. and aircraft manufacturers, with a view to reducing the rising cost of building and improving runways. The working group will consist of the representatives of Australia, France, Ireland, the United Kingdom and the United States.

* * *

Pan American Airways have applied for permission to operate a service to Munich airport, now used by the U.S. Army, which has been providing nearly all the air transport to and from the city.

* * *

According to the November bulletin of I.C.A.O., the council of the organization is to send a letter to the States concerned in the Weather Ships scheme, urging them to make every effort to implement the scheme without delay.

* * *

Swissair is reported to be contemplating a substantial increase in its long-range services next year. Services to Rio de Janeiro, Montevideo and Buenos Aires are planned to start in January, February and March, 1948.

* * *

Last week we reported developments in the dispute between Ansett Airways and the Australian Civil Aviation Department; the Airline had refused to make a 20 per cent increase in fares agreed upon by all other operators, was threatened with refusal of the use of government-controlled airfields, and had retaliated with an injunction seeking to prevent this. Now, the C.A.D. has called a conference of all major airlines to seek a way out of the deadlock. Ansetts have already refused a compromise order to raise fares only on those routes in competition with Trans-Australia Airlines.

* * *

A re-test of the 600 pilots employed by Australian operators is being carried out by the Department of Civil Aviation, to see if flying ability has dropped below the required standard. The tests, none of which will be made on passenger flights, are believed to have been inspired by the report on a Dakota crash of the Air Accidents Investigation Committee, which stated that the pilot had not carried out a baulked single-engine approach for two years, and never on a Dakota aircraft.

* * *

Under a new Government air programme, Portugal is to build airfields at Sal Island, in the Cape Verde group, and Faro, in Southern Portugal. The Sal Island airfield is to open early in 1948, and will be used as a staging post for a Lisbon-Rio de Janeiro service which will commence as soon as this airfield is open. The Faro site is said to be particularly free from fog, even in winter, and is expected to be useful as an emergency airfield when others are fogbound.

HEAVY-DUTY LIGHT AIRCRAFT: Mr. A. E. Rumbold, the well-known instructor at Luton Flying Club, and Mr. D. D. Dunnett, from West Africa, with a Tiger Moth. Mr. Dunnett, who weighs 22 stone, visits Luton to fly every year. Mr. Rumbold, who sometimes flies with him, is 15 stone.

FROM THE CLUBS

Mr. Harry Young, a freelance cinematographer, has made a film about private flying which, it is understood, is to be shown at a number of cinemas. Elstree airfield is the focal point, and the film shows how a private aircraft is "garaged," serviced and flown.

* * *

Redhill airfield was not derequisitioned until last May, so that the Redhill Flying Club is only now completing its first six months of post-war activity. Previously, three Magisters and four Auster Autocrats had been made ready, and flying instruction began at once. The first member to fly, Mr. Sam Harris, aged 74, was given 4 hours 50 minutes of dual instruction and then flew solo again. In October the first 1,000 hours of flying was completed, and at the end of November the total was over 1,200. There are 251 members, of whom 70 are non-flying or honorary (staff) members, while the remainder are full flying members, 145 of whom are flying regularly. A Link trainer is one of the club's facilities, there is a squash court, and first-class meals are being served. The petrol position prevents the holding of any more dances, but a Christmas dinner is being organized. The Club will be closed from after lunch on December 24th until lunch-time on the 28th.

The Club officials are Mr. K. Maxwell, chief instructor; Mr. A. S. Burridge, secretary and second instructor; Mr. C. Nepean Bishop, assistant instructor; and Commander H. T. Molyneux, aerodrome manager.

* * *

Reading Sky Observers' Club held its first annual general meeting last Friday. At a meeting a few days previously, in the Miles Aircraft games room, Mr. P. Wood read a paper on "Unusual Experiments on Wartime and Civil Aircraft," and an aeronautical version of the "twenty questions" programme was held.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

SUBSIDIZED FLYING

A Reiteration

IN reply to D. W. N Carter (*Flight*, November 27th), may I ask him, please, to read my letter again? I specifically and deliberately used the words "teaching" and "to learn," which cannot apply to anyone who has *already* learnt.

I also used the words "take on full flying duties" deliberately, as I was very obviously referring to the "floating reserve of pilots," who are the future G.D. pilots of the R.A.F., and not to pilots who could still fly in a non-operational capacity.

F. S. SYMONDSON.

Many Duties Can be Fulfilled by Older Pilots

I WOULD like to take this opportunity of expressing my disagreement with Mr. F. S. Symondson's views on the above, expressed in his letter published in *Flight* on November 20th, wherein he stated: "A man of 32 would only just be allowed to take on full flying duties; any age beyond that must be a waste of taxpayers' money."

My initial flying training was carried out at the Cardiff Aeroplane Club with the aid of Government subsidies, thus enabling me to fly and still live within my means. In the war just finished I made my first operational flight against the enemy as pilot and captain of a heavy bomber at the age of 35, and I am confident in expressing the belief that there were a large number of pilots older than myself similarly engaged.

Again, quite apart from operational duties there are others of equal importance that can well be fulfilled by older men and women, e.g., flying instruction, ferrying, flying for navigation and signals instruction, and test piloting.

I hope Mr. C. L. Pashley will not object to me quoting his efforts in the last war, wherein he flew continuously as a flying instructor, and I happen to know that his fiftieth birthday was a thing of the past. I am sure that everyone will agree that efforts such as these have proved of value to the nation, and well worth the subsidies granted before the war.

I do agree with Mr. Symondson when he states "subsidies come out of the pockets of the whole taxpaying population, who cannot *all* be wanting to fly, so that the many would be paying for the few." But, as only the few who are willing and capable of flying will be the ones who will be of service, then the many should be duly grateful and willing to contribute to the cost of the nation's defence.

The younger people wishing to fly have added opportunities provided for in the Auxiliary Air Forces and the Volunteer Reserve, but the older and equally capable pilots have only the clubs to look to in order to keep up their standard of flying, and, believe me, the clubs need the subsidy badly in order to keep going.

ARTHUR D. JORDAN, D.F.C.

CORPORATION POLICY

Why the Viscount?

AFTER reading, in *Flight*, a description of the Vickers Viscount, and realizing that it is, after all, little more tangible, as yet, than a gleam in its designer's eye and an ache in the stressman's head, I begin to wonder what the Corporation is about. This 32-43-passenger pressurized aircraft is a medium-range type cruising at 230 to 270 knots, depending on the power plants. No doubt it will be a thorough estimable civil aircraft, but what has it got, apart from its prop-jets, which is not already to be seen in the Ambassador?

In the latter we have an aircraft, in very full and, I may say, beautiful existence, fulfilling the specification "to a T" and simply waiting for the engine manufacturers to bring their prop-jets to the economical-commercial stage of development. Meanwhile valuable flying experience is being gained, proving both the airframe and the present engine installation.

Reading further into the article, I learn that the Viscount will require eighteen months of proving flights for the airframe alone, and that commercial operation is not visualized by B.E.A.C. until 1951. Now, I ask myself, why is all this development being backed by a Corporation which is already very much in the red, with the object of turning out a type (in 1951) which we already have in the air to-day, and which could carry their flag to all of Europe in 1949? It is all very well to say that by postponing the purchase of new aircraft until 1951 the Corporation reduces the amortization rate on its Vikings—thus making it easier for them, meanwhile, to show a profit and so placate the Treasury in 1949 and 1950—but if that attitude is taken, it is not at all consistent with the sister Corporation's view on interim types and Tudors in particular.

If Vikings are accepted as standard equipment until 1951 or 1952 in the face of Continental competition flying on the wings of Convair 240s and Martin 202s, then B.O.A.C. have no excuse for refusing to accept Tudors as interim types to be used until a similar date over routes on which business is nothing like so competitive. It seems that Airspeeds and Avros are both victims of a muddle-headed Corporation policy, which seems to aim at killing any inspired designing.

Altogether I think that the Corporations and attendant Ministries have done far more harm than good to the industry through their vacillating whims and fancies. I think it is just about the last straw for them to develop the Viscount when the Ambassador has been there all the time.

P. H. PIMBLETT.

LARGE FLYING BOATS

Air-Freight Carriers of the Future

HOW far into the future is one allowed to look when discussing the flying boat? If we may venture a peek I think we shall find the answers to many of the arguments raised in the correspondence columns of your journal.

For the first time in the history of aviation, airframe manufacturers have power plants that have developed beyond the scope of their present engineering. Surely this will lead to the demand of larger airframes, not with payloads of a few hundred tons, but, I suggest, of thousands of tons.

The need of large freight-carrying aircraft has been long outstanding in the operation of world airlines. If such aircraft are to be developed on these lines, surely they will take the form of flying boats. It is only a question of time when the expense of building of prototypes will be a practice of the past. If the designers of the future, with all the experience of those gone before, cannot put such an aircraft straight into operation, well . . . . !

I see no great difficulty of operating boats of such size. Every world port is a potential flying-boat base. The facilities for unloading cargoes are already there. The cost of equipping such ports would, methinks, be less than that of developing our present airfields to accommodate aircraft of such enormous size. In any case the tremendous problems of undercarriage design seem to rule out the use of the landplane. Blind-approach systems, flare paths, in fact, all the paraphernalia of airfield control, can still be mounted on launches and seem to be the least of the problems.

In fact, I see no reason why the future should not give us passenger-carrying landplanes of the two-hundred-ton class (but not beyond), operating from modified airfields, and freight-carrying aircraft of a far greater capacity operating from the sea.

F. B. CLARK.

PEACE OF MIND

Interim Standardization Impossible

UPON reading "Resurgam's" "Peace (Of Mind) In Our Time" in the November 27th edition of *Flight*, I experienced an ever-growing feeling of astonishment, until finally I wondered whether we readers were having our legs gently pulled. The plea for wide use of well-proved and available systems while waiting for that elusive thing perfection, is sound enough, but unfortunately "Resurgam" appears to be not too well informed on the subjects of equipment availability and system limitations. His suggestion for a composite application of I.L.S. and S.B.A. for quadrantal orientation lacks realism, and any attempt to employ such a scheme would result in nothing short of chaos.

In this interim period, which must of necessity precede the general introduction and use of I.C.A.O. recommended systems, it is impossible to achieve any universal interim standardization and therefore regrettably essential that as many as four different landing aids be provided at some international airports. At London Airport, for example, the aids to final

Correspondence . . . .

approach include: BABS (for Rebecca fitted aircraft), S.B.A., G.C.A. and—on the few occasions that it is serviceable—S.C.S.51 (modified to be equivalent to the C.A.A. I.L.S.). A large percentage of aircraft is at present dependent upon S.B.A. and it will not be possible to employ I.L.S. more widely until British manufacture is well under way, thus any suggestion that the S.B.A. be used as a rather vague quadrantal indicator is quite out of the question. Consider now those aircraft using, when possible, the I.L.S. Many of these are flying on the North Atlantic route and I am confident that no airline operator, certainly no American company, would be prepared to fit a difficult-to-procure S.B.A. airborne equipment for use at London Airport alone.

The idea of using I.L.S. for 50ft-50yds minima is pure fantasy, and no Master of aircraft familiar with the I.L.S. system limitations would ever risk his aircraft and passengers in such conditions. (The lowest I.L.S. minima contemplated by the C.A.A. is 200ft-1,000yds.)

The most valuable *existing aid* for general orientation and holding purposes is, without a doubt, the radio compass or A.D.F. Intelligent use of this aid in conjunction with BABS, S.B.A. or I.L.S., the final stages of the approach being monitored by G.C.A., goes very far towards constituting a sound interim plan for airfield control, approach and landing.

"CAMPANOLOGIST."

PARACHUTES AND THE PERSONAL AUTOGIRO

Some Ringway and A.F.E.E. Reminiscences

BRUCE WILLIAMS, in his interesting article in the November 20th issue, made some illuminating general remarks on parachutes and parachuting which I feel require some qualification. He was sceptical, to say the least, on the subject of spot-landings by parachute, and I judge from this, and from the context, that his association with Ringway and what later became A.F.E.E. was in the very early days. Even Ringway and A.F.E.E. became reasonably proficient in spot-landings by parachute, although they did not develop this aspect to the extent that we developed it for dropping supplies and "bodies," male and female, to the various underground organizations known collectively as the "Maquis."

This special development and production work was under my control for five years (I am not certain if I am allowed to mention its location, even yet—such is the influence of the "cloak-and-dagger"). The basic conception was to provide graded sizes of parachute for weight to give the mean rate of descent of a man on a 28ft-diameter parachute, so that reasonable spacing on alighting could be combined with accuracy of spot-landing when dropping "sticks" of a mixed character. This system worked excellently under the extremely difficult and hazardous conditions of operation, and, incidentally, the damage rate of stores and men was a small fraction of one per cent.

Imagination boggles at the sight of similar sticks descending in the midst of individual whirling blades, although I admit that my only experience with blades was when we tried out the idea of a senior Army officer for dropping single pigeons in a container controlled by a rotor blade. The net result was that the container and pigeon spun around while the rotor remained stationary, although the pigeon was undamaged on landing, being merely somewhat shaken and distinctly surprised!

Of course, the shortage of silk did not limit parachute production for long, because nylon, rayon, Celanese, and several types of cotton (called Ramex to deceive the gullible (?) and conservative parachutist) were developed for all uses. In this connection, the work of the back-room, or more properly "back-field," boys should not, as it invariably is, be forgotten or ignored. New materials made up into parachutes, and new types of parachute, for man-dropping were dropped with dummies for a *minimum* of 1,500 drop-tests at my unit before being passed on to A.F.E.E. for *experimental* five-dropping, plus initial and incidental practical and laboratory tests by R.A.E., with which (or should it be whom?) I and A.F.E.E. co-operated closely, and on the whole amicably. Then and not till then, was a batch of the new production passed on to Ringway for *service trials*, which had to meet the meticulous standards and conditions of the Ringway instructional staff—a member of which would promptly do his four-hundredth jump with one of the new type, and get his name and his photograph in the papers!

Many of the basic designs and modifications originated with these "back-field" boys and the manufacturers, and only some from Ringway. I wrote a long (perhaps over-long) and comprehensive technical book on the *Theory and Practice of Parachuting*, based on the work done by the various associated units and departments, which was initially accepted by two publishers (at different times), and subsequently, after some eighteen months' delay and three re-writings, returned to me with deep regrets. The manuscript now lies, probably mouldering and mouse-nibbled, in my basement—perhaps if I resurrected it and titled it "A Prelude to the Prelude," some publisher would snap it up.

H. R. BUNN, M.B.E., A.R.Ae.S.

VEHICLES AT AIRPORTS

Stricter Discipline Needed

THE question of controlling vehicular traffic on airfield perimeter and taxi tracks is not always accorded the attention it warrants.

Vehicles obstructing the perimeter tracks have been responsible for damage to aircraft, and aircraft have, at other times been forced to leave the perimeter track and become bogged for hours in the mud.

Any casual visitor to the public enclosure at Northolt would have seen vehicles sandwiched between aircraft awaiting take-off, and pilots are no doubt distracted during the take-off or landing when an occasional truck dashes across the end of the runway.

Some interesting correspondence has appeared in your columns recently on this subject, and no doubt the problem will ultimately resolve itself when the projected modern airports are completed, but meanwhile surely the answer lies in (a) prohibiting unnecessary traffic; and in a far more imaginative use of (b) the runway controller, (c) the airfield police, (d) diversion boards to direct vehicles along appropriate taxi tracks.

All drivers should require a pass to use the airfield, and such a pass should not be issued to anyone who is not thoroughly acquainted with airfield procedure.

A change of the runway in use would, as one of your correspondents pointed out, involve moving or replacing diversion and "No Entry" boards, but the staff of 24 men, for instance, on the flarepath crew at Northolt should have no difficulty in coping with this. One has only to recall the pre-electric flarepath days when a few men coped with a night runway change involving far more work than this.

Nevertheless, "No Entry" boards will be quite useless if the instructions contained thereon are not strictly enforced. This should be the task of the airfield police.

The present tendency is to employ large numbers of policemen who have, for the most part, been quite ineffective in this particular field because (1) they themselves are not acquainted with airfield procedure; (2) they are immobile; (3) they have but a very limited authority. A small, intelligent, alert, mobile police force should have the authority to summon to a civil court drivers who ignore the runway controller's red light, or the "No Entry" boards.

One of your correspondents, C. C. Allinson, is apparently not aware that runway controllers are employees (if they will excuse the word) of the Ministry of Civil Aviation, and have as such always been an integral part of Air Traffic Control. They can play a very valuable part in controlling vehicular traffic, and I cannot agree with your correspondent, "Air Minded," ex-Army, that such control should be done from the Control Tower.

Your correspondent R.B.S., who applied for the post of Air Traffic Control Officer, might take note that the M.C.A. never have, to my knowledge, been short of applicants for these posts, and his discovery of two A.T.C.O.s on duty at one of London's airports is hardly surprising. The last census at London Airport revealed the presence of no fewer than 31.

The new air traffic control scheme was delayed because the M.C.A. could not recruit 70 clerks for control duties—precisely the type of minor but important grade which R.B.S. "disgustedly declined, without thanks." "VENTILATOR."

FORTHCOMING EVENTS

Dec. 12th.—R.Ae.S. (Graduate and Student): "Aircraft Design from the Airline Point of View." Christopher Dykes, A.F.R.Ae.S.

Dec. 17th.—Aircraft Recognition Society: Competition for the Society Trophy and "Christmas Quiz," compered by Mr. E. A. Wren.

Dec. 18th.—Royal Aeronautical Society: "The work of the High-Speed Tunnel." Prof. A. Thom, M.A., D.Sc., and W. G. A. Perring, F.R.Ae.S.

Jan. 5th.—R.Ae.S. (Derby): "Aircraft Photography." John Yoxall.

Jan. 6th.—R.Ae.S. (Belfast): "Some Experiences in Experimental Gliding." Prof. Hill, M.C., M.Sc., M.I.Mech.E., F.R.Ae.S.

Jan. 7th.—R.Ae.S. (Southampton): "Rotating Wing Aircraft." C. G. Pullin.

Jan. 7th.—British Interplanetary Society: "The Man-Carrying Rocket." R. A. Smith, F.B.I.S.

SERVICE AVIATION

"Flight" photograph.

OPERATIONAL TRAINER: *Formerly known as the Firefly Trainer, the Fairey Operational Trainer is an adaptation of the Firefly I fleet fighter. Together with the Firefly IV, this type is now being produced in quantity.*

Royal Air Force and Naval Aviation News and Announcements

New Director of Movements

AIR COMMODORE LEONARD TAYLOR, who has been Senior Air Staff Officer, No. 41 Group R.A.F. Maintenance Command, since May, 1946, will succeed Air Commodore H. D. Jackman as Director of Movements at the Air Ministry on January 5th next. Air Commodore Jackman is to be posted to the Imperial Defence College for the 1948 course. In his new post A. Cdre. Taylor will be responsible for all traffic movements of the Royal Air Force, whether by air, sea, road or rail.

Imperial War Museum

AN MG15 gun from the first German aircraft (a Do 17) shot down by "Cobber" Kain is among the new air relics from the 1939-45 war recently placed on view at the Imperial War Museum, Lambeth. Engaged on a photographic flight, the Dornier was attacked at 27,000 feet over Lubey, France, on November 8, 1939, and was one of the first German bombers destroyed over the Continent. Another of the new exhibits is the score-card of No. 254 Air/Sea Rescue Unit, which operated in the Mediterranean from July, 1943, to August, 1945. This is an airscrew blade bearing the names of the unit's officers and launches, a list of decorations gained and bases of operation. Rescues are indicated by small painted reproductions of the national markings of the "ditched" aircraft. In 73 successful sorties, launches from the unit saved 315 Allied and enemy airmen. Other items include a Vickers gas-operated machine-gun, a Hercules engine, a cylinder from a Japanese "suicide" aircraft that near-missed the aircraft carrier *Illustrious*, and a model of the famous attack on Taranto harbour.

About half the area in the museum dealing with the 1939-45 war is now devoted to the air fighting. The exhibits range from a complete Spitfire which took part in the Battle of Britain to a German rocket and flying bomb. There are also various items of aerial equipment, including 33 aircraft, which cannot yet be displayed owing to lack of space.

Flying Fatigue

NEW steps to fight aircrew fatigue are being taken by Transport Command in the drive against possible causes of air accidents. Regulations drawn up in consultation with flying medical specialists, experienced on the Command's routes, lay down maximum flying hours and minimum rest periods so as to ensure that fatigue will not undermine the efficiency of the crews. Crews of Transport Command aircraft must not in future exceed 1,000 flying hours a year, 300 hours in any one period of three months, or 120 hours in any one monthly period. Aircrews engaged in flying must not normally spend more than sixteen hours out of bed in any one period of 24

NOW A BOMBER: *Shown here is a Bristol Brigand T.F.I. torpedo fighter, as demonstrated this year at Radlett. It may now be stated that a bomber conversion—designated Brigand B.I—has been developed and that certain light bomber squadrons of the R.A.F. will be armed with this mark.*

Service Aviation . . . . .

hours. If this time out of bed is seriously exceeded a 24-hour rest period is recommended, with 18 hours rest as the minimum requirement. The figures can be exceeded only when emergency operational considerations might justify additional risk.

Sea Fury F.B.XI

MODIFIED up to the latest standard, the Hawker Sea Fury naval fighter-bomber (Bristol Centaurus XVIII) takes the above designation. The first 50 production Sea Furies were Mk. Xs.

Strength of University Squadrons

A TOTAL of 416 men are flying as members of the R.A.F.V.R. in the 14 University Air Squadrons. Of these, 158 are mainly ex-service pilots. The remainder are chiefly young students without previous flying or war experience. Universities which have air squadrons, with their present strengths, are: Aberdeen (31), Belfast (20), Cambridge (47), Durham, Edinburgh (20), Glasgow (27), Leeds (22), London (49), Manchester (43), Oxford (55), St. Andrew's, Birmingham (43), Nottingham (42), and Southampton (17). The last three are expected to provide candidates for the Technical branch. With those flying in University Air Squadrons the total number of R.A.F.V.R. pilots and pilots under training is now over 1,000.

A.A.F.—The First Year

AFTER one year of recruiting, the strength of the 20 flying squadrons in the Auxiliary Air Force has reached approximately a third of the total establishment of some 3,000 men at present needed. Altogether some 1,350 applications have been received, 450 of which have been from ex-aircrew wishing to fly again. Flying personnel already enrolled number 250, out of about twice that number required, and 60 more have already been recommended for acceptance. The more difficult task of building up the far bigger number required for ground crew has made good progress. Ground crew enrolled numbered 585 since recruiting began for the A.A.F. last November, which is well over twice the flying personnel enrolled. There was a particularly big increase in ground personnel in October, when 109 applications were received—an increase of nearly 25 per cent over those applying in the previous eleven months.

The attainment of full flying personnel strength in the A.A.F. is now very largely governed by how quickly more ground crew can be enrolled. The intake of flying personnel, being relatively smaller, is being restricted generally to keep pace with that of the ground crew who service the aircraft to enable the necessary amount of flying practice to be maintained. It requires, on the average, about ten men on the ground in a squadron to keep one aircraft flying.

The top ten squadrons in respect of the total number of applications received were:—

No. 615 (County of Surrey) (94 applications); No. 607 (County of Durham) (91); No. 502 (Ulster) (84); No. 608 (North Riding) (84); No. 613 (City of Manchester) (83); No. 500 (County of Kent) (76); No. 610 (County of Cheshire) (73); No. 604 (County of Middlesex) (68); No. 611 (West Lancashire) (66); No. 616 (South Yorkshire) (66).

Out of a total of 879 men accepted to date, 233 (167 ground crew), come from London and the Home Counties. This leaves 646 (419 ground crew) accepted from other less populated areas. Those commissioned total 200.

CZECHOSLOVAKIA THANKS THE SERGEANT: Seen receiving the thanks of the Czech Military and Air Attache after receiving the Czech Medal of Merit is Sergeant Joseph O'Rourke. The Sergeant was responsible for the care and return to relatives of personal belongings of fallen Czechoslovak members of the R.A.F.

Squash

THE Royal Air Force Squash Rackets Championship at the Lansdowne Club was won by W/C. D. S. Pain, who beat Cpl. G. D. Evans by 9—5, 9—7, 10—8.

B.A.F.O. Defeats Fighter Command

THE British Air Forces of Occupation (Germany), defeated Fighter Command by five goals to nil in the second round of the Air Force Inter-Command Association Football Cup. The match was played at Minden.

Christmas Leave

CHRISTMAS leave in the home Commands of the R.A.F. this year will be from after duty on December 23rd until late evening on December 29th and will be granted at the discretion of unit commanders to as many personnel as can be spared from duty. This period will not be counted against privilege leave unless it is included in or added to normal leave. Only those going on privilege leave will be issued with free travel warrants. Those who are prevented by R.A.F. duty from proceeding on pass for this period at Christmas may be given a pass for an equivalent period at the New Year, from after duty on December 30th until late evening on January 5th.

Imperial Defence Course

HOME and Dominion air force students for the one-year course at the Imperial Defence College in 1948 are to be attached to the Air Ministry during the first week in January so that they may be brought up to date in current Air Force problems and policy. During their attachment, the eight Royal Air Force and Dominion air force students, all of air rank, will meet heads of branches, who will describe future trends and developments and discuss current problems and policy. On the last day (January 9th) they will be addressed by Lord Tedder, Chief of the Air Staff. The course begins on January 13th.

The function of the Imperial Defence College is to train senior officers of the Commonwealth fighting services and senior officials of Government departments in the broadest aspects of Imperial strategy so that they can effectively guide national and service strategy.

34½ Years

AFTER 34½ years' continuous service, F/L. T. Carrol is retiring from the R.A.F.

Houses for Disabled

TWELVE semi-detached houses have been built at Morden, Surrey, by the R.A.F. Benevolent Fund for disabled R.A.F. officers and their families or for the widows of Air Force officers. The first tenants moved into three of the houses last week. The houses will be known as Trenchard Court. One of the first tenants is the widow of a flight lieutenant who was killed over Germany on his fifty-first sortie with Bomber Command. Owing to the housing shortage she had been living in a condemned cottage with her two young children, a seven-year-old boy and a girl of ten. Other homes being built near by for disabled airmen, their wives and children, will, when completed, be named after R.A.F. V.C.s.

Reunion

A REUNION dinner for No. 210 Squadron, R.A.F., will be held in London, on Friday, January 23rd, 1948. Past and present members wishing to attend should communicate with the Honorary Secretary, S/L. S. G. Baggott, D.F.C., Officers Mess, R.A.F., Kidbrooke, London, S.E.3

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